Mining CONGRESS JOURNAL

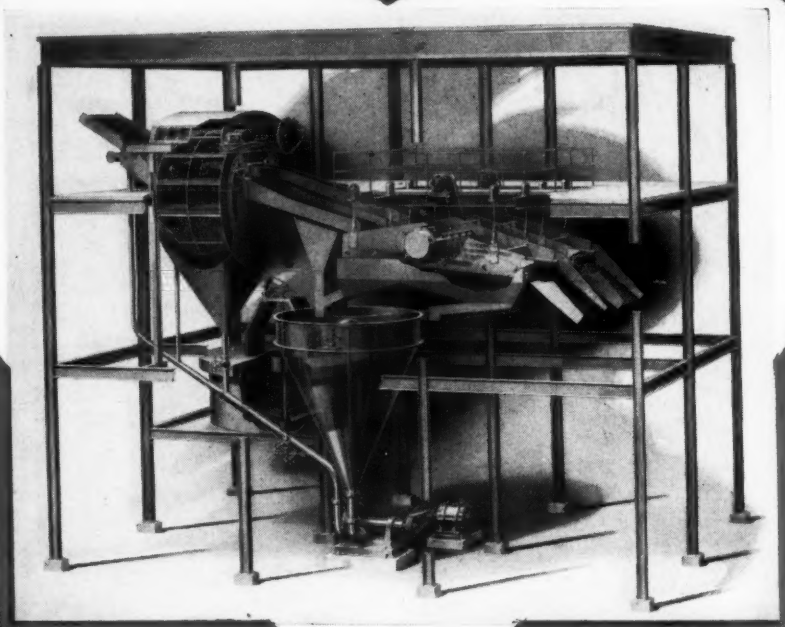
THE AMERICAN MINING CONGRESS

APRIL
1948

Featuring-

25th Annual Coal Convention

The New
LINK-BELT Float-Sink Concentrator



The drawing above shows the concentrator, flumes, vibrating screens, thickener, sump, media circulating pump and storage cone. The complete magnetite reclamation circuit is illustrated and described in Link-Belt Book No. 2101.

The "Heart" of Heavy-Media*

The Link-Belt Float-Sink cleaning method has been in use for considerable time, with results so satisfactory that contracts have been made to install it in a number of other coal mining operations.

It cuts coal cleaning costs by making sharp separations at predetermined and stable specific gravities of medium with the range extending as low as 1.25 . . . it produces a clean float with a minimum of sink material or rejects, and a clean sink with a minimum of float material . . . handles large coal, reducing the necessity for manual picking . . . requires only one operator . . . has low operating and maintenance cost; low capital investment.

The heart of the Heavy-Media System is the Link-Belt Float-Sink Concentrator, consisting essentially of a drum-shaped tank to contain the liquid media and a rotating elevator with perforated lifter shelves that deliver the sink material to a flume. Liquid media are used to flume the float material to a vibrating screen. We invite the coal mining industry to take advantage of our experience on Heavy-Media and other cleaning methods.

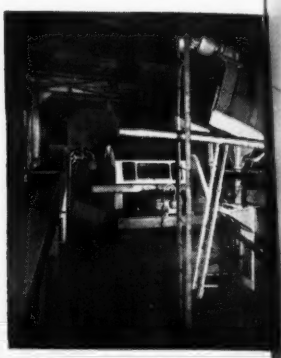
*The Heavy-Media Separation Processes are licensed by the American Zinc, Lead and Smelting Company. American Cyanamid Company, 30 Rockefeller Plaza, New York 20, N. Y. are their sole Technical and Sales Representatives for these processes.

11,028

LINK-BELT COMPANY

Chicago 9, Philadelphia 40, Pittsburgh 19, Wilkes-Barre, Huntington, W. Va., Denver 2, Kansas City 6, Mo., Cleveland 13, Indianapolis 6, Detroit 4, St. Louis 1, Seattle 4, Toronto 8.

Float-Sink test as applied laboratory technician to sep materials of different sp gravities. With the Heavy-M system, the liquid is a suspe of magnetite in water.



Part of Link-Belt Float- equipment in cleaning plan large coal operator. The st ture with windows, is the hou on the top of the Float-Sink centrator. The densifier is sh in the upper right hand por of the picture.

Ask for your copy of this B No. 2101 illustrating the Li Belt Float-Sink Concentrator Heavy-Media method of cleani

COAL PREPARATION AND HANDLING EQUIPMENT

Engineered, Built and Backed by LINK-BELT

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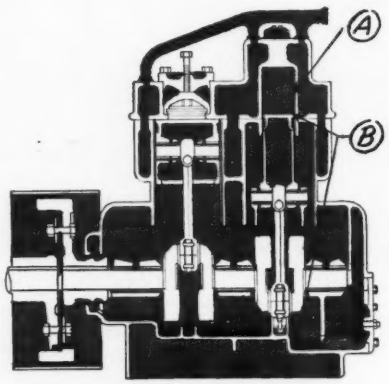
CASE 1045--MINIMIZING OIL OXIDATION AND DEPOSIT TROUBLE IN AIR COMPRESSORS.



TWO-STAGE, 2 CYLINDER AIR COMPRESSOR

In air compressors of all types and sizes, heat-resistant Calol Multi-Service Oil materially reduced deposits on discharge valves, cylinders, bearings and in crankcases. Comes in six viscosity grades: 45X, approximately SAE 10; 50X, SAE 20 medium; 55X, SAE 20 heavy; 65X, SAE 30; 75X, SAE 40; 85X, SAE 50.

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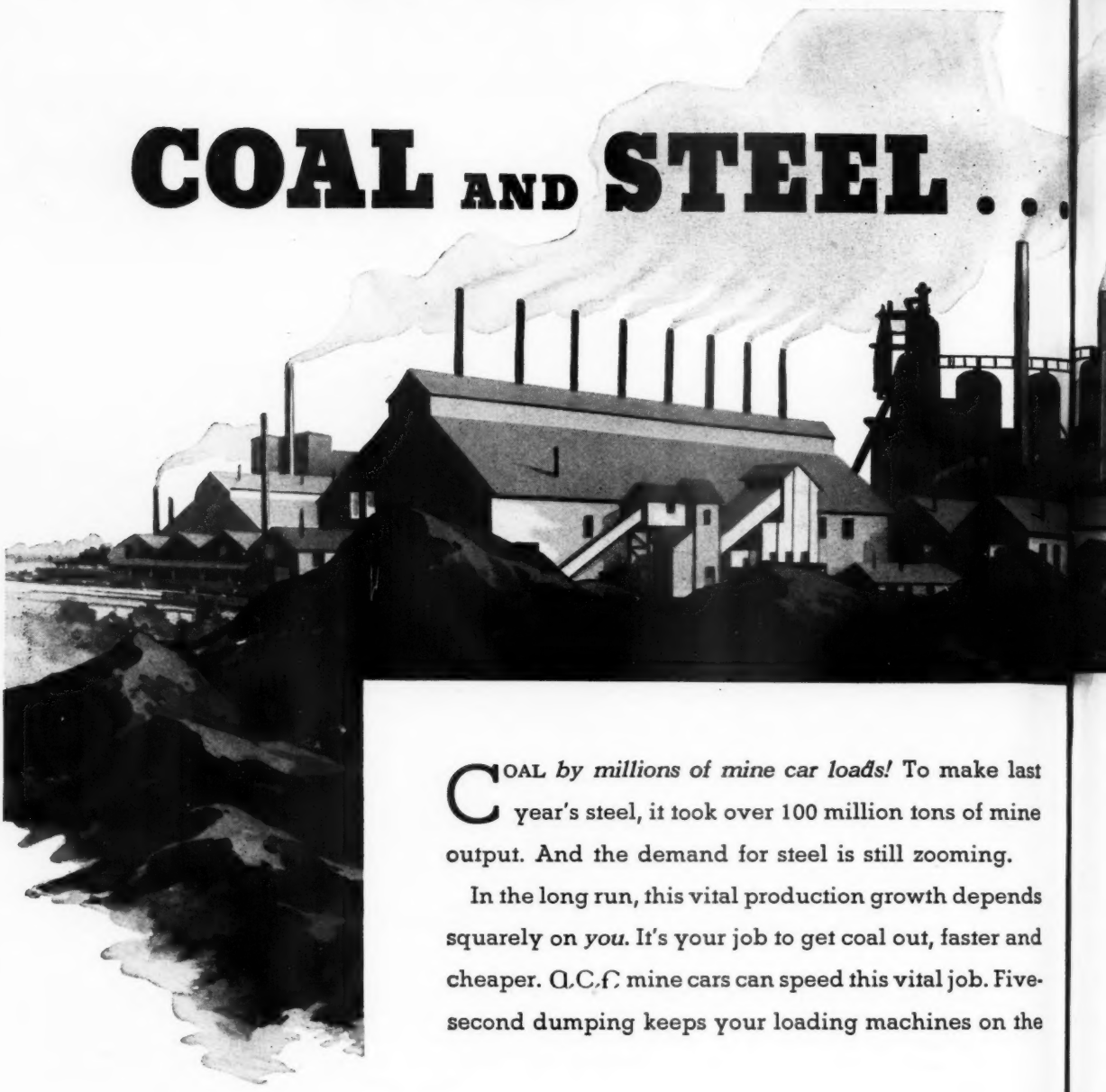
COAL AND STEEL . . .



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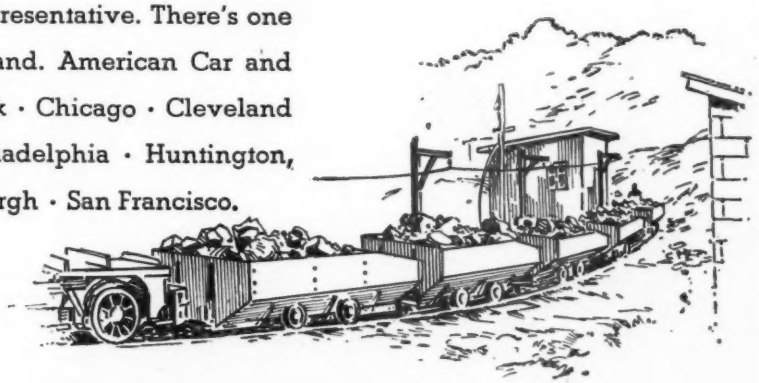

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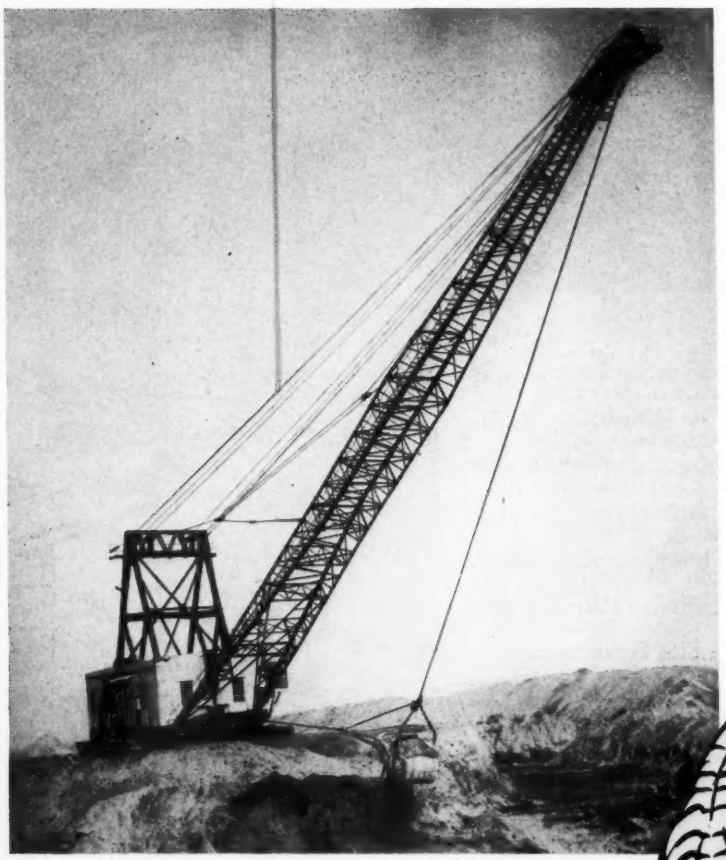

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for Mines Using KENNAMETAL Cutting Machine Bits

Lower Bit Cost per Ton

Kennametal Bits cut many more places than steel bits before they become dull; can be resharpened many times. Typical reports by users:

Ohio No. 5 seam—.48¢ bit cost per ton.
Ohio No. 8 seam—.35¢ bit cost per ton.
Penna "B"—.4¢ bit cost per ton.
W. Va. mine—Bit cost per ton reduced 75%.

Less Maintenance on Machine

Free-cutting Kennametal Bits frequently pay for themselves by reducing maintenance work on mining machines. Example: Butler County, Pa. mine—"The reduction in cost of repairing friction drums and replacing feed and tail ropes and other worn-out parts is more than the cost of Kennametal Bits."

Reduced Power Costs

Typical reports: Pittsburgh seam—"Power consumption reduced 33% since we equipped with Kennametal Bits." Kentucky mine—"Power reading for steel bits was 150 to 200 amperes as compared to 80 amperes using Kennametal Bits."

More Saleable Coal

In seven out of ten cases Kennametal Bits produce coarser cuttings, less dust. Example: Cedar Grove, W. Va. seam—30% coarser cuttings by screen test.

Greater Production

Kennametal Bits require fewer bit changes—less time is wasted changing and resetting. Fewer men are needed to handle, sharpen, and haul bits to and from the face. Examples: Kanawha County, W. Va. mine—"Kennametal Bits cut 27 places before becoming dull; over 300 places before being replaced." Fayette County, W. Va. mine—"Before Kennametal Bits were used, the machine men worked overtime to keep the loader supplied. Now the cutting crews work only regular shift hours; easily keep plenty of coal available for loading."

Kennametal Bits cut faster, wear longer, cost *less* to keep on the job. They save valuable time at the face; help balance operation. Write for factual performance data "Form MM-60".

Mining Division, Kennametal Inc., Latrobe, Pa.

Kennametal Outwears Steel 100 to 1

Kennametal cemented carbide is much harder than steel (up to 80.6 on the Rockwell C scale as compared to 65-66 maximum for steel). Its compressive strength is approximately 33% higher, and its resistance to deformation is 2 to 3 times that of steel. The combination of these characteristics enable it, as a general rule, to outlast steel up to 100 times.

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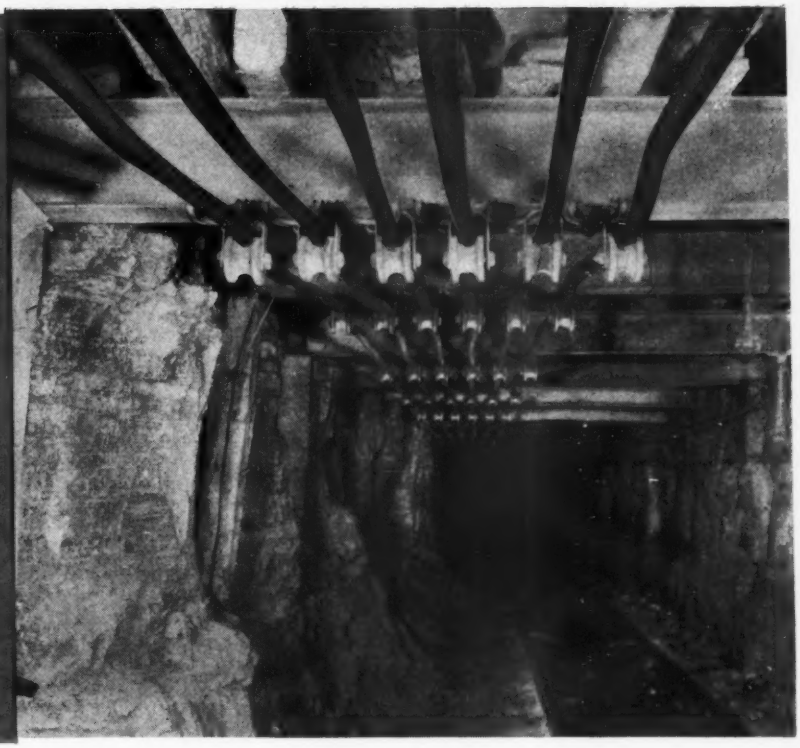

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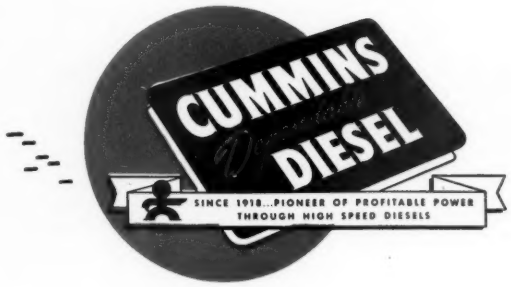

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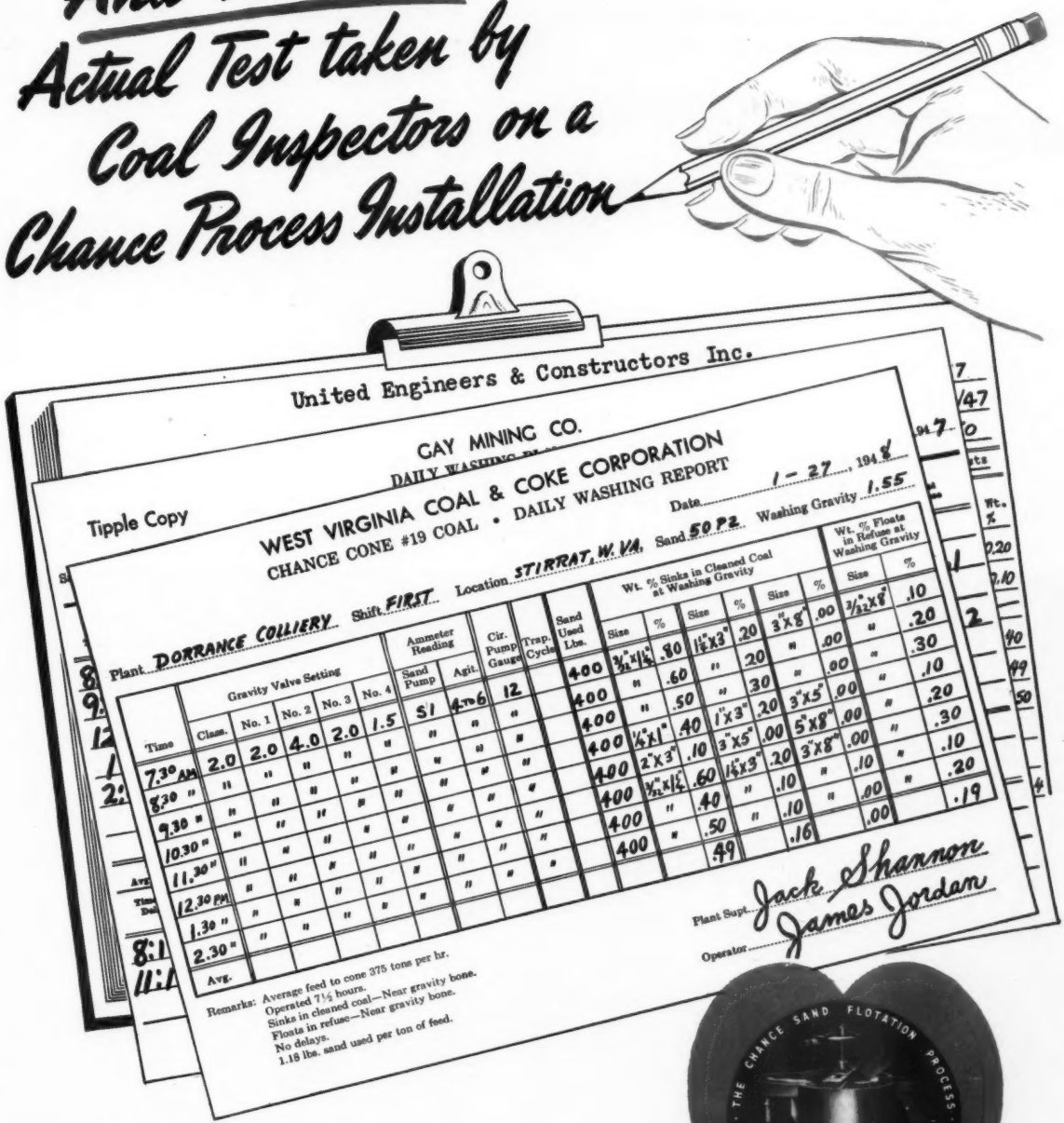
And Another Actual Test taken by Coal Inspectors on a Chance Process Installation



United Engineers & Constructors Inc.

GAY MINING CO.

DAILY WASHING REPORT

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WEST VIRGINIA COAL & COKE CORPORATION

CHANCE CONE #19 COAL • DAILY WASHING REPORT

Date 1 - 27 , 1948

Plant DORRANCE COLLIERY Shift FIRST Location STIRRAT, W. VA. Sand 50 P2 Washing Gravity 1.55

Time	Gravity Valve Setting: Clean.	No. 1	No. 2	No. 3	No. 4	Ammeter Reading: Sand Pump	Agit.	Cir. Pump Gauge	Trap. Cycle	Sand Used Lbs.	Wt. % Sinks in Cleaned Coal at Washing Gravity: Size	%	Size	%	Size	%	Wt. % Floats in Refuse at Washing Gravity: Size	%
7.30 AM	2.0	2.0	4.0	2.0	1.5	S1	4 to 6	12		400	3/32"x1/4"	.30	1/4"x3"	.20	3"x8"	.00	3/32"x8"	.10
8.30 "	"	"	"	"	"	"	"	"		400	"	.60	"	.20	"	.00	"	.20
9.30 "	"	"	"	"	"	"	"	"		400	"	.50	"	.30	"	.00	"	.30
10.30 "	"	"	"	"	"	"	"	"		400	1/4"x1"	.40	1"x3"	.20	3"x5"	.00	"	.10
11.30 "	"	"	"	"	"	"	"	"		400	2"x3"	.10	3"x5"	.00	5"x8"	.00	"	.20
12.30 PM	"	"	"	"	"	"	"	"		400	3/32"x1/4"	.60	1/4"x3"	.20	3"x8"	.00	"	.30
1.30 "	"	"	"	"	"	"	"	"		400	"	.40	"	.10	"	.10	"	.10
2.30 "	"	"	"							400	"	.50	"	.10	"	.00	"	.20
Avg.										400		.49		.16		.00		.19

Remarks: Average feed to cone 375 tons per hr.
Operated 7½ hours.
Sinks in cleaned coal—Near gravity bone.
Floats in refuse—Near gravity bone.
No delays.
1.18 lbs. sand used per ton of feed.

Plant Supt. Jack Shannon

Operator James Jordan

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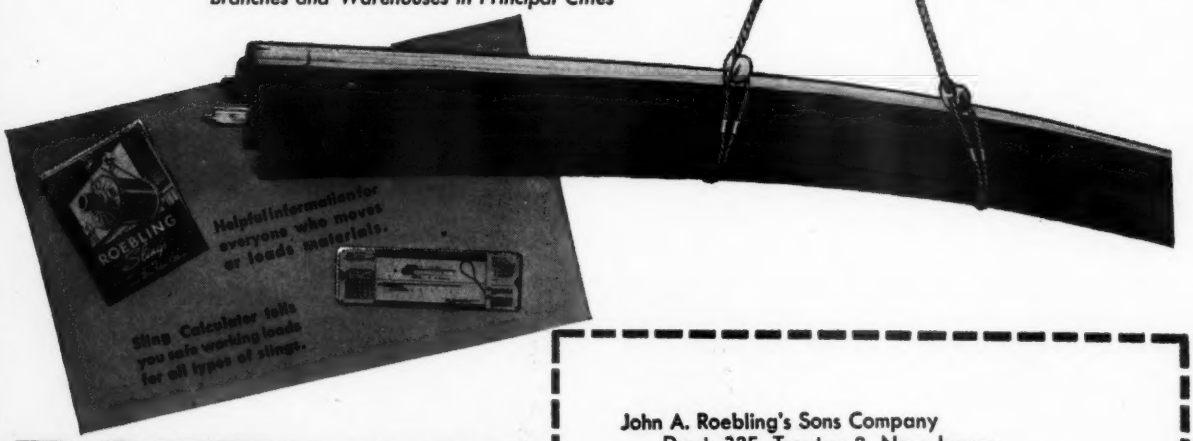
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80 to 100 seven-foot 2½" holes per seven-hour shift

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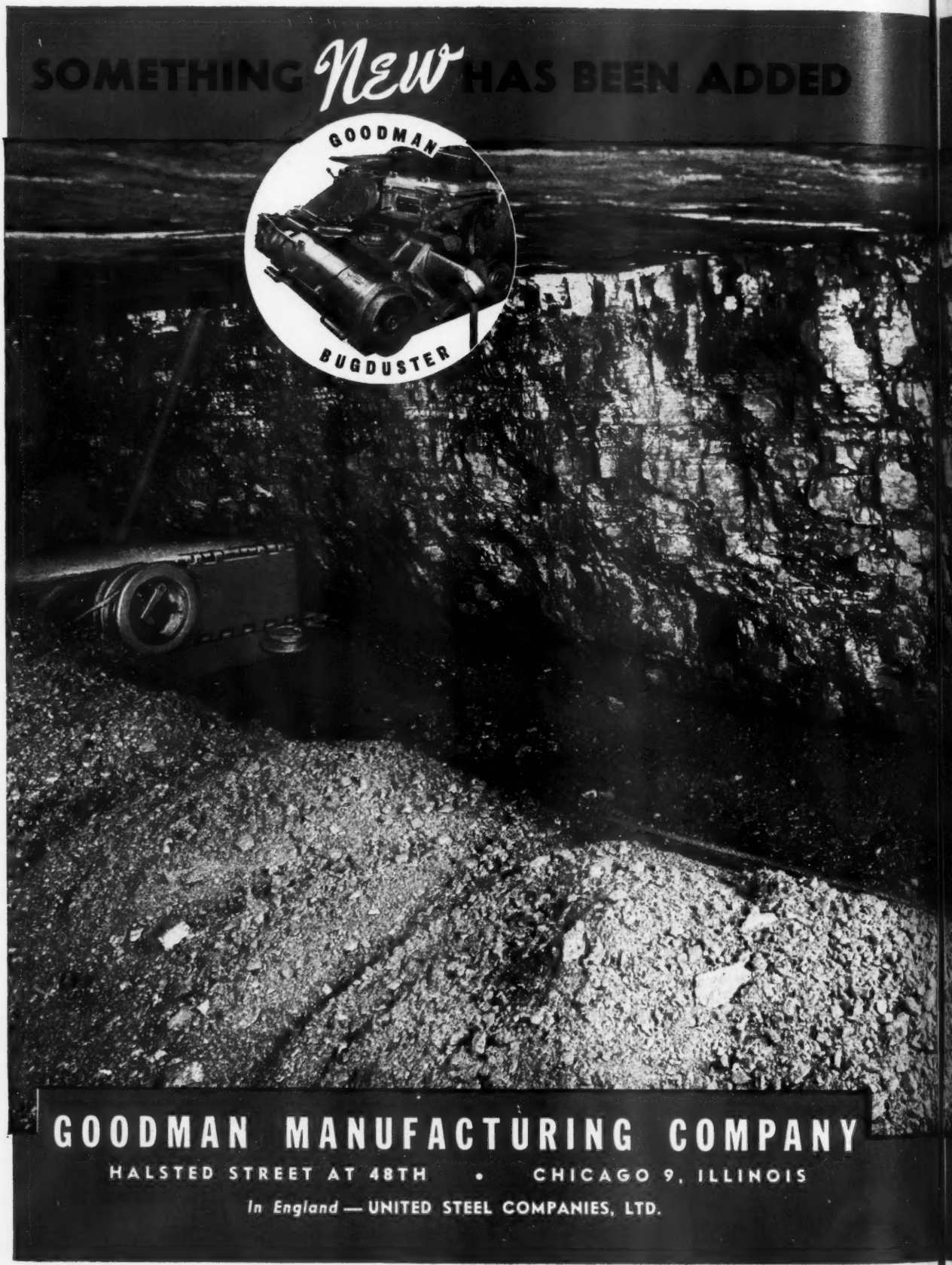
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GOODMAN MANUFACTURING COMPANY
HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS
In England — UNITED STEEL COMPANIES, LTD.

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No more raking of the kerf; no more shoveling of cuttings . . . in fact, no more shovel.

Yes Sir,

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The success of "C-M-I" Dryers—proved by records of many leading preparation plants that dry millions of tons yearly—is due to the outstanding efficiency and economy of operation. Its operating performance and costs are unequalled by any other method or machine.

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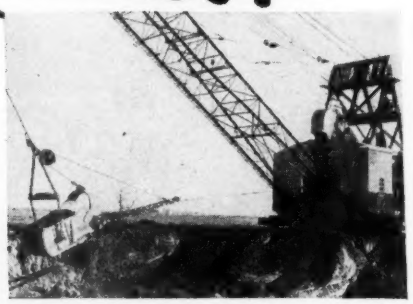
Whether your requirements are for a 3/8 yd. bucket or 30 yards, a Page AUTOMATIC will move more dirt in less time than any other bucket made. It digs in immediately and gets a full load within one or two bucket lengths. There's little or no spillage with each full load. Page AUTOMATICS are built no heavier than your specific job requires but have all the necessary weight for good digging, sturdiness and minimum maintenance. The new booklet, "How to Get the Most Out of Your Page Automatic Dragline Bucket" will give you complete details. Send for your copy today.

a Page Automatic of Course!



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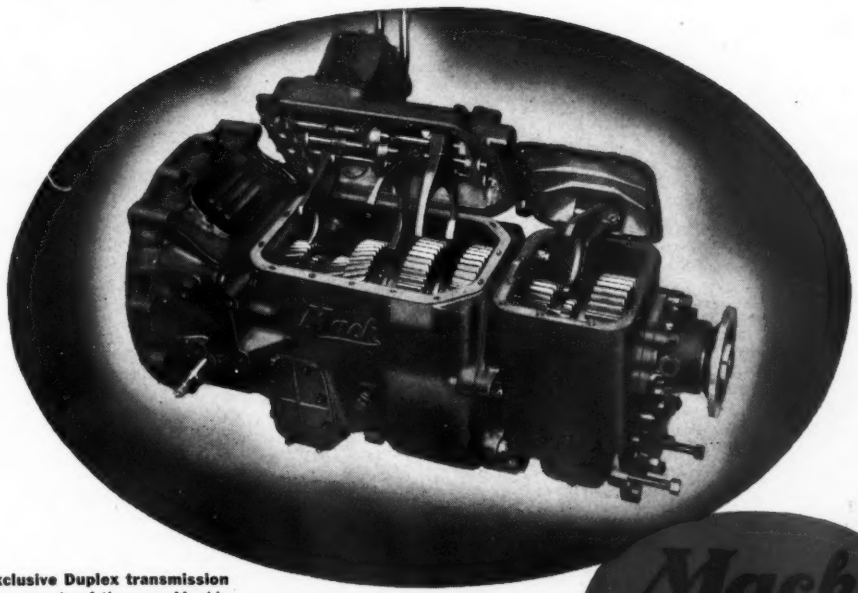

Mack's exclusive Duplex transmission is another example of the way Mack's better design pays off in better performance — on the job. Engineered as a single unit, the Mack Duplex gives eight forward speeds with easy even intervals between speeds. Closer steps result in higher average speed, easier shifting, better acceleration, improved fuel economy and less maintenance.

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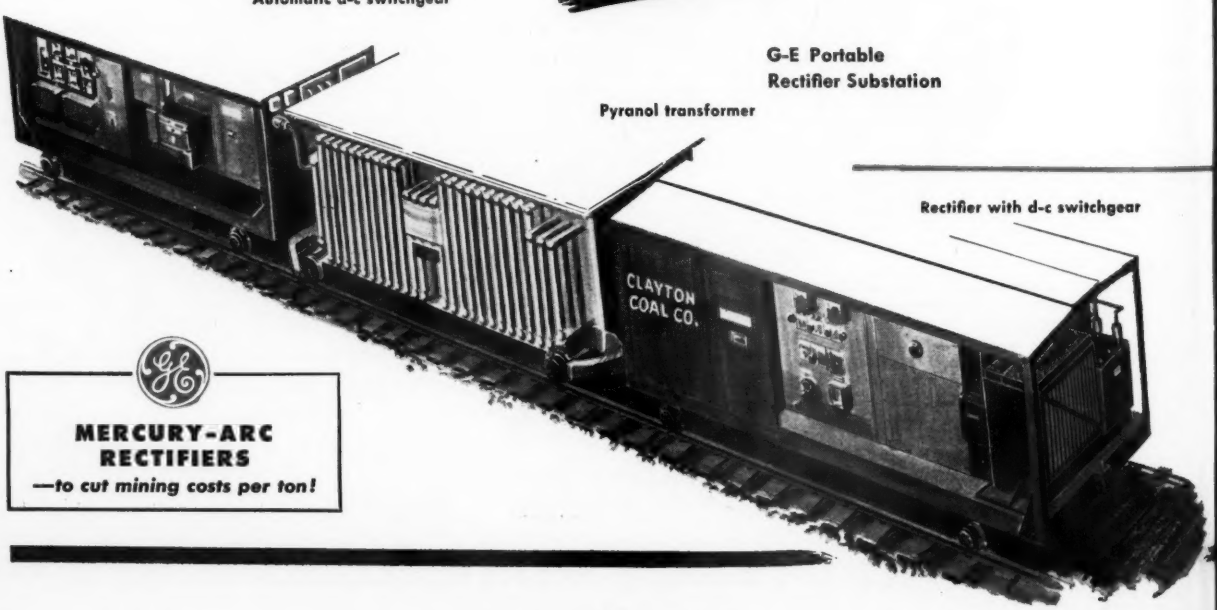

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—to cut mining costs per ton!

G-E Portable Mercury-Arc Rectifier gives this Colorado mine operator higher working voltage at the face—more efficient mining machinery operation—higher output per shift.

At the Clayton Coal Company's Washington Mine, with a voltage of 190 v at the working face, coal cutter speed used to be 17 inches per minute. A round trip for a loaded car took 12 minutes.

Now, with the working voltage raised to 275 v, coal cutter speed averages 32 inches per minute—*a jump of 88%*. Round trips for the same number of loaded cars take 8 minutes—cutting *one-third off* the former time. Here's how it was done:

Early in 1946, a 200-kw G-E portable sealed-ignitron mercury-arc rectifier was delivered to the mine entrance and moved easily on the haulageway tracks to a position near the cutting face. A-c and d-c connections were made quickly and simply, putting 275 volts of d-c power near the cutting face. This completed the installation.

The G-E rectifier has cut over-all mining cost per ton with these definite improvements:

MORE EFFICIENT OPERATION—because voltage at all underground electrical equipment is held to close limits and power continuity is assured even during peak load periods.

LOWER LINE LOSSES—because the d-c power is transmitted over shorter distances to the working area, making ample power available right where it's needed.

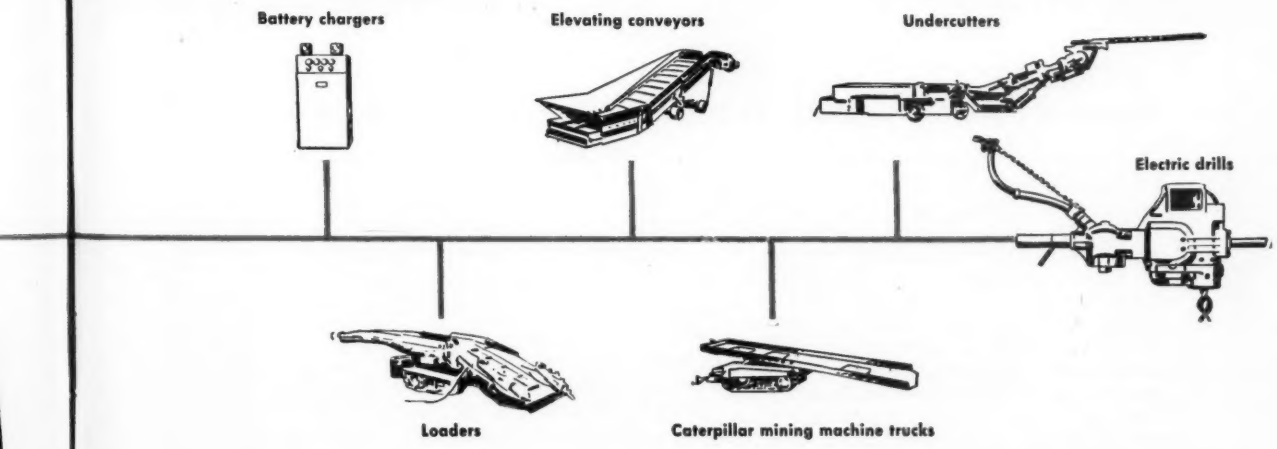
In fact, this mine operator, who is one of the largest in the northern Colorado field, says the rectifier equipment paid for itself in a year with greater production at lower cost.

Have you looked into the cost-reducing possibilities of a G-E mercury-arc rectifier for your underground mining operation? Get the facts now. Call or write our nearest office for Bulletin GEA-4047. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

G-E PORTABLE MERCURY-ARC RECTIFIERS provide these worthwhile advantages for underground applications:

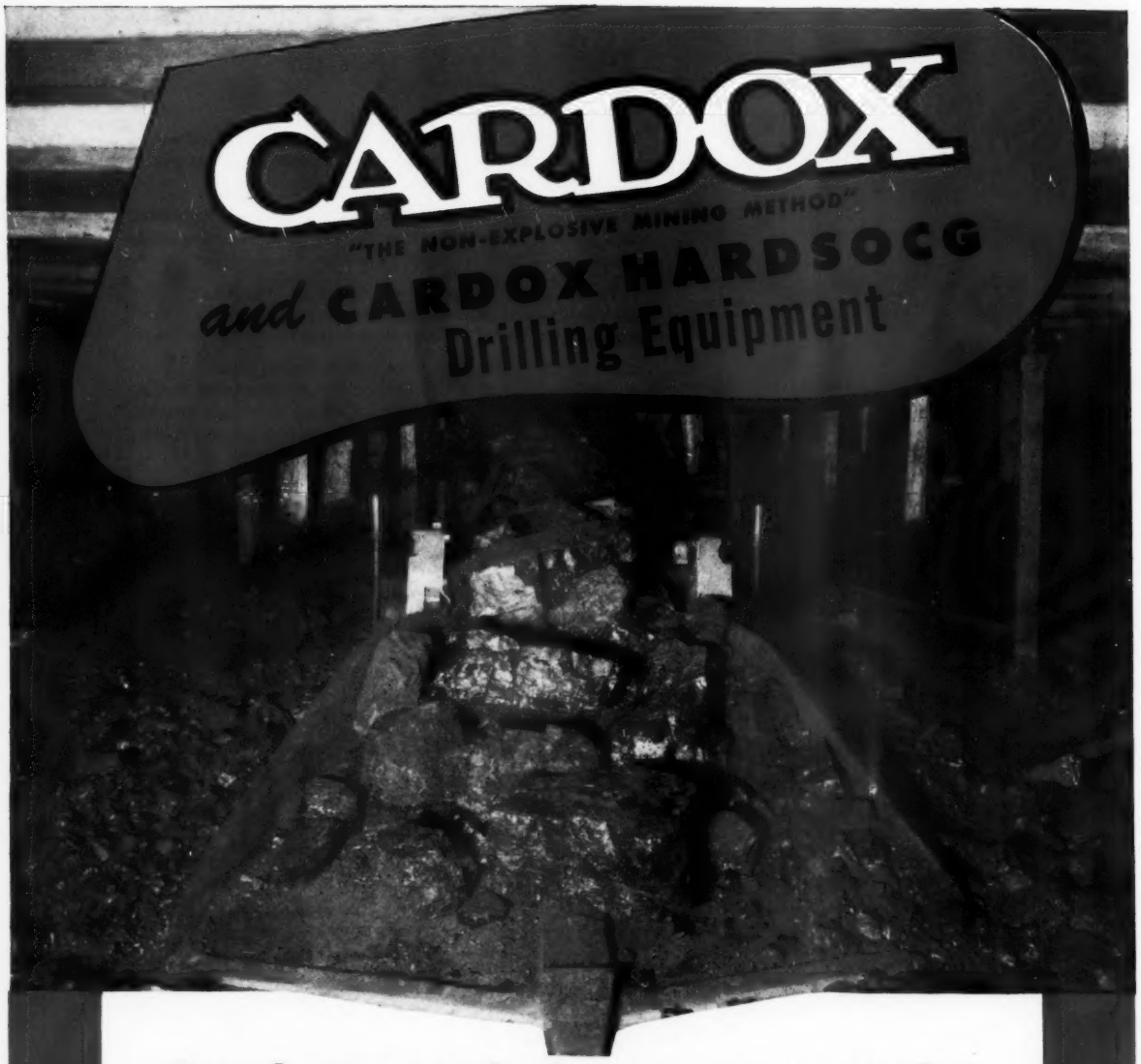
1. Enclosed for greater personnel safety
2. Highly portable close to the working face
3. Low-height design for use in thin seams
4. Wide range of available ratings
5. High conversion efficiency in all ratings
6. Low maintenance costs
7. Long, continuous service

Schematic diagram below shows how the G-E portable mercury-arc rectifier substation serves mining machinery in the Washington Mine of the Clayton Coal Company.



GENERAL ELECTRIC

657-66



Guard your profit from seam to Market

The advantage of the CARDOX mining method manifest themselves at practically every stage of production and marketing.

For example, longer cutter bars can be used . . . providing more coal per face. Loading is faster because the slow heaving action of CARDOX rolls the coal forward in a loose pile. This same action produces a maximum of coarse sizes, free of shatter-cracks, that will not crumble when subjected to extensive mechanical handling.

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Write for full details on free demonstration of CARDOX production economies and marketing advantages.

CARDOX CORPORATION • BELL BUILDING • CHICAGO, ILLINOIS

AT Robena
THE WORLD'S LARGEST COAL MINE-

—Eight Whaley "Automats" Are Speeding Development Work

From the beginning, in 1937, Whaley "Automats" have been rushing development work in the H. C. Frick Coke Company's Robena Mine in Greene County, Pa.

Officially opened in September 1946, this U. S. Steel mine, although nowhere near full production, is already producing an output of 14,000 Tons of coal per day. In each department of this world's largest producing mine, every modern mining practice and the most modern and proved dependable equipment, backed by sound engineering and business experience, are being utilized.

We are indeed proud of the part our loaders are playing in this technically and mechanically perfect operation. Back of the "Automat's" efficient service in this mine is a reputation for dependable service and features in operation that only the "Automat" can render. Only the "Automat" can give you a vertical lift shovel action loading head. Only the "Automat" can give you the automatic parallel-lift rear conveyor for maximum loading in limited head room. Only the "Automat" gives you an average loading rate of 3 tons per minute with only one 25 H. P. Motor. And, because of the "Automat's" exclusive vertical lift shovel action, it's always a safe machine in the closest places.

The photograph above shows one of the "Automats" at the Robena mine starting a cross cut. Note the heavily loaded front conveyor and also the parallel-to-car rear conveyor.

MYERS-WHALEY COMPANY, KNOXVILLE, TENNESSEE

Myers-Whaley

Remember, the "Automat" loads, in its stride, any lump of coal that will pass through your tipple, or any lump of rock your cars, aerial tram or larries, can take.

MECHANICAL LOADERS EXCLUSIVELY FOR OVER 40 YEARS

Exide
IRONCLAD BATTERIES

for extra power, long life and low operating cost

When your locomotives, trammers and shuttle cars are powered by Exide-Ironclad Batteries, you can count on peak performance at minimum haulage cost. For only Exide-Ironclad Batteries have ALL FOUR of the vital characteristics of a storage battery —HIGH POWER ABILITY, HIGH ELECTRICAL EFFICIENCY, RUGGEDNESS and *LONG LIFE* (The average life of all Exide-Ironclad Batteries renewed in locomotive and shuttle car service last year was 73.4 months).

This fine service record is due to special construction, which differs from that of all other batteries. One important difference is the positive plate. This plate consists of a series of slotted tubes which contain the active material. So fine are these slots that, while they permit easy access of the electrolyte, they retard active material from readily washing out . . . thus assuring years of safe, dependable, day-in-and-day-out mine haulage service.

If you have a special storage battery problem, or wish more detailed information, write:

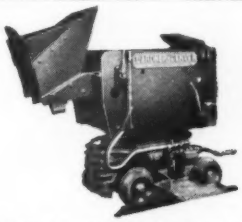
THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

Gardner-Denver R94 Stoper—the *new*, lightweight (100 pound) self-rotating stoper. Perfectly balanced between high drilling speed and power of feed at all pressures. A powerful stoper—with working parts completely protected from sludge—it cannot "nose dive."

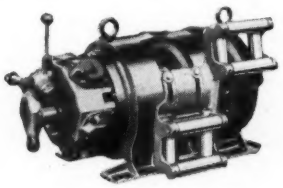
Gardner-Denver R104 Stoper—this famous, heavy-duty stoper has exceptionally high drilling speeds, perfect physical and operative balance. A favorite with drill runners whenever footing is precarious.

Gardner-Denver CF89H Drifter—the drifter with the "Built-in" self-adjusting feed. The speed of the drill responds ***automatically*** to bit penetration—the type of ground being drilled regulates the speed of feed. Practically vibration-free—easier on set-ups.

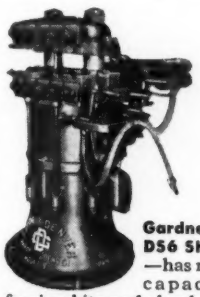
Gardner-Denver 55S Sinker—widely known as the most efficient 55-pound sinker on the market. A hard hitter, it has proper balance between air power, striking power and rotative power.



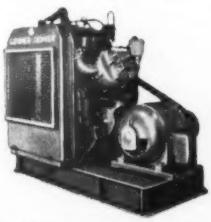
Gardner-Denver GD14 Loader—adjustable swing stops give this "Big Bite" loader a wide clean-up range. Two 5-cylinder radial air motors supply powerful crowd on minimum air pressure. Extremely low center of gravity an important safety feature.



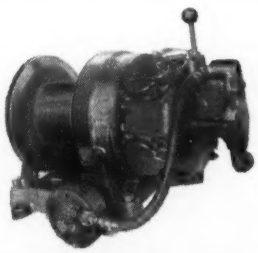
Gardner-Denver HME Airslusher—a high torque 5-cylinder radial air motor develops extra rotative power—assures greater crowding even at low speeds. Controlled by a ***single*** throttle lever that can be operated by two fingers. Compactly built. Light in weight.



Gardner-Denver D56 Sharpener—has maximum capacity for forging bits and shanks on largest sections of drill steel. Handles any standard size of hexagon, quarter octagon or round steel.



Gardner-Denver WB Vertical Water-Cooled Compressor—a two-stage compressor that meets the modern demand for a small machine having efficiency comparable to large horizontal compressors. *Two* small-diameter, low-pressure cylinders. Combination radiator and air-cooled intercooler.



Gardner-Denver HKK Safety Hoist—a lightweight, compactly built hoist of outstanding durability, especially designed to provide extra safety for the man and the load. Completely sealed gear train keeps oil sealed in, water and dirt sealed out.

For complete information, write
Gardner-Denver Company, Quincy, Ill.

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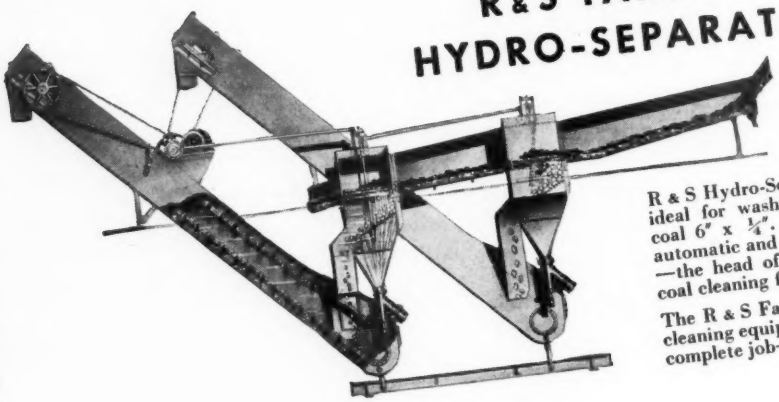
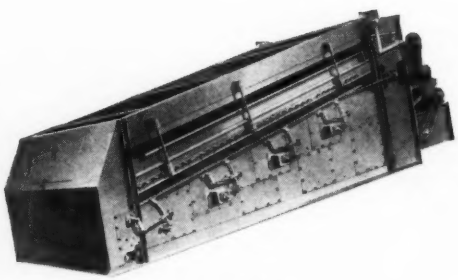
OF COAL CLEANING EQUIPMENT

R&S TANDEM HYDRO-SEPARATOR



R & S Hydro-Separator is ideal for washing coarse coal 6″ x ¼″. It is fully automatic and continuous —the head of the R & S coal cleaning family.

The R & S Family of coal cleaning equipment does a complete job—a good job.



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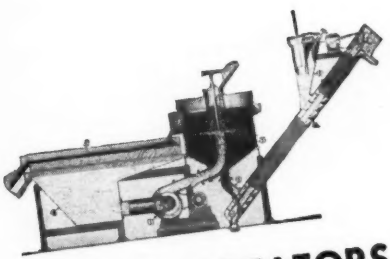
R & S Super-Airflow is a highly efficient unit for dry cleaning fine coal—a valuable product reclaimed from coal formerly discarded as refuse.



R&S HYDROTATORS

R&S Hydrotator process for smaller coal sizes ¼″ x 0″ in combination with the Hydro-Separator above forms a complete cleaning plant . . . promotes total low cost mechanization underground.

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★ Mining CONGRESS JOURNAL ★

Published for the Entire Mining Industry

by the American Mining Congress

SHELDON P. WIMPFEN, Editor

APRIL

VOLUME 34 1948 NUMBER 4

Continuity Is the Key

LAST year coal output attained the near-peak production of 619,000,000 tons and the year was significant for the small extent of operating shutdowns. The coal supply was ample to meet all foreign and domestic needs. The estimated demand for bituminous coal in 1948 has been placed at 585,000,000 tons to satisfy domestic needs and to supply European countries with an estimated 45,000,000 tons. Each day not worked means a loss of approximately 2,500,000 tons of coal, hence an 18-day shutdown at the mines would result in the loss of production of the amount of coal required to meet the emergency needs of Europe for an entire year. As we go to press, the coal miners have been out for 22 days.

Despite the increased use of liquid fuels and gas in various fields as sources of industrial power, 80 per cent of our railway fuel is coal. The efficient coal-fired gas turbine locomotive will be ready for road tests some time this year.

Coal leads as the power source for electrical generating equipment and planned expansion of our power supply relies principally upon coal-burning steam plants. Steel production requires coal at a rate in excess of 80,000,000 tons annually. A wide variety of synthetic products call for increasing quantities of coal as their basic raw material. Coal touches all we have, and, as the dominant primary fuel, constituting 98.8 per cent of the nation's mineral fuel energy reserves, is the silent partner of our free enterprise system.

Realizing that sustained operation at a profit, in addition to adequate transport facilities, is essential to the life of the coal industry, coal mine operators exert every effort to assure steady employment, at good wages and under good working conditions, to the miners. Bituminous coal miners average about $72 per week, surpassing nearly every other industrial group in earning power. Thousands of bituminous coal miners earn $400 to $500 a month and some earn even more.

Constant instruction in safety has made the miner's job, on the basis of hours worked, twice as safe as it was 40 years ago, and on a basis of tons mined, his job is four times safer. Training in safety never falters in the effort to reduce mine accidents to a minimum. Since 1930 fatalities in relation to tonnage mined have dropped 57 per cent.

Although management has consistently exerted itself to ensure the earning power of the miner under safe working conditions, operations have not been continuous. Shutdowns called for by the mine workers' leader pending adjustment of wage and other demands have repeatedly interrupted production. Yet increased costs have only raised bituminous coal prices 74 per cent above the 1935-1939 average, as cost saving equipment and methods have been installed to offset in part the higher wages. This compares favorably with the 95 per cent average increase in all commodities, at wholesale, which has developed in the same period.

Less than 5 per cent of our bituminous coal is pick mined and hand loaded. Today 90 per cent is machine cut and 58 per cent is mechanically loaded. Increased mechanization, with a continuously decreasing reliance upon manual effort to produce coal, is the constant goal of this progressive, wide-awake industry.

Each year, for 25 years, the Coal Convention of the American Mining Congress has been held to advance the art and science of coal mining, to increase tons produced per man shift under safer conditions, to improve efficiency in every phase of operations, and to produce high quality fuels adapted to specific uses. New ideas always result from the open forums where ways and means of doing the job better are presented and discussed. The program of the 1948 Coal Convention is especially well-balanced, with papers which will be interesting and profitable to operators of every type of coal mine.

For many years mining men have dreamed of a means of cutting and loading coal in a single operation, and numerous experiments conducted during the past 20 years have contributed towards the realization of this goal. The latest development in continuous coal mining will be announced at the 1948 Coal Convention, when a description will be presented of a machine which has passed through the experimental stage and is now in practical operation. This machine may well be the forerunner of many others that will push still higher the tons-per-man-shift ratio and place American coal mining practice many lengths ahead in the race for maximum production with a minimum of danger, effort, and cost.

Management and capital have provided an unbroken flow of money, machines, and ideas to make our coal mining industry operate at its best. The coal miner has performed notable service in production—when at work. His uninterrupted efforts are essential to the well-being of our industrial economy. Only unwarranted power in the hands of a few selfish, dictatorial men can prevent the coal industry from continuing to fulfill its obligations to American industry and to national and world progress.

Loading a 32-ton coal hauler.

★

By LESTER E. BRISCOE

Electrical Engineer
Ayrshire Collieries Corporation

★

Strip Mine Truck Haulage

The Factual Data and Experiences Here Presented Are Particularly Important in View of the Definite Trend Toward Truck Haulage in Open-Pit Coal Mining.

IN 1946 the total bituminous coal and lignite mined by open-cut methods in the United States exceeded 109,000,000 tons. It has been fairly conservatively estimated that at least 90 per cent of this tonnage was hauled by trucks, either entirely or in part, from coal face to preparation plant, to transfer point or to conveyor, or direct to consumer. With this predominance of truck haulage some of the facts and conclusions developed from experience in actual operations with which I have been associated, are worthy of presentation.

Varied Haulage Equipment Meets Special Conditions

Six strip mines are in operation by the Ayrshire Collieries Corp. and another mine is now under construction. All of these mines are now using or will use trucks to haul the coal, in part or entirely, from the pit to the preparation plant. At each mine the coal is transported from the pits by trucks, first over the coal berm and then over company-owned roads to a common transfer point or directly to the hopper at the preparation plant. At the Ayrshire and Patoka mines, the coal is loaded from the trucks into railroad cars, thence by rail to the preparation plant.

A fleet of six International tractors with United Iron 20-ton trailers.

A total of 60 trucks with a combined capacity of 1461 tons are in operation at these six mines. At the Harmattan mine, now under construction, it is proposed to use seven 20-ton trucks. This decision was made for two reasons: first, because part of the coal will be loaded into trucks on the fire clay; second, due to the short distance from the coal face to the preparation plant hopper.

A tabulation of the number of coal hauling units in use at the mines of the Ayrshire Collieries Corp. are shown in Table 1. At the Ayrshire mine, coal from the pits is hauled on contract. All of the mines, except the Ayrshire and Patoka mines, use trucks powered by Diesel engines. At these two mines, gasoline engines are still in use. The Autocars at the Patoka mine were originally at the

Paper to be presented at the 1948 Coal Convention of the American Mining Congress, at Cincinnati, Ohio, Tuesday afternoon, April 27.

TABLE 1—COAL HAULAGE EQUIPMENT OF AYRSHIRE COLLIERIES CORPORATION

Mine	No. Units	Tractor	Trailer	Tons Capacity
Ayrshire	9	International	United Iron Works	20
Chinook	8	Euclid	Euclid	32
Clinton	1	Autocar	Austin-Western	20
	6	Euclid	Euclid	20
Delta	5	Euclid	Euclid	32
Flamingo	2	Autocar	Austin-Western	20
	6	Dart	Austin-Western	25
	2	Dart	Austin-Western	30
	5	Euclid	Euclid	20
Patoka	9	International	Sanford-Day	30
	7	Autocar	Sanford-Day	15
Harmattan	7	Euclid	Euclid	20

Delta mine and have been converted from Butane to gasoline. The reason for the conversion was to eliminate the necessity of moving the Butane storage equipment for the short anticipated life of the trucks at the Patoka mine. The haulage equipment at this mine was purchased in 1934 to 1937 and plans call for replacing this equipment in the near future with Diesel-powered coal haulers. The Flamingo mine Dart trucks were originally powered by gasoline engines but were converted to Diesel engines during 1947. This is also true of the Autocar trucks now in use at the Clinton and Flamingo miner.

All Diesel trucks have Cummins engines. The Cummins 200-hp engine is used in trucks having a capacity of 25 tons or more and the Cummins 150-hp engine is used in 20-ton capacity trucks. The first Diesel-powered trucks were purchased during World War II and, being inventory-minded, the company has requested Cummins Diesel engines on all trucks that have been ordered since 1945. Now the company has, including one spare of each size, 44 Diesel engines. Five of these Diesel engines are in trucks used to haul refuse from the preparation plant.

Experience has shown a considerable saving in truck operation by converting from gasoline to Diesel power, because less fuel and cheaper fuel is consumed. In no case has it been necessary to employ special Diesel mechanics to replace garage mechanics formerly used to make adjustments and repairs on gasoline or Butane powered trucks.

Details of actual operations of Euclid 20-ton and 32-ton coal haulers are shown in Table 2. In order to get a true comparison of the two units, it is necessary to correct the truck cycle time due to the size of the loading shovel used. If this is not done, the time to load the truck is considerably more when using a two-cubic yard loading shovel than when using a 7½-cu yd loading shovel. This comparison is made on the assumption that a 7½-cu yd shovel is used for both sizes of coal haulers.

Each mine has its own problem in haulage-road cost and maintenance. For example, at one mine it is possible to use refuse from the preparation plant for maintaining the haulage roads, although at another it is necessary to purchase crushed stone or gravel. There are many such variables and for that reason, truck roads are left out of this cost-per ton-mile calculation.

Permanent Haulage Road Insures Trouble-free Operation

A description of the construction of a permanent haulage road from the edge of the coal to the preparation plant hopper might be of interest due to its importance to cycle time. Various conditions in the pit haulage road change from day to day, therefore pit road is omitted. The major portion of the haulage road at the Chinook mine is a well-maintained, permanent road constructed through spoil banks made several years ago. The subgrade was made during the winter season with a three cu yd drag line and bulldozer. The drainage ditches along side the grade were made with the bucket of the drag line and are usually as wide as the bucket. All slopes of the cuts through the spoil banks vary as to the material encountered. The base material for this road was refuse from the coal washing plant, usually placed in two lifts. Crushed stone of 2 by ¾ in. size was then applied 4½ to 6 in. thick and bound to the base material by truck traffic. Final surface material was then applied, consisting of minus ¾-in. crushed stone 1½ in. thick. The road is maintained daily, especially on hoist day, by a Caterpillar No. 12 motor grader.

Maximum plus grade of 5.15 per cent is encountered by the loaded truck, but the average plus grade is 2.45 per cent for No. 1 pit and 3.42 per cent for No. 2 pit. The plus grade is encountered by the trucks on leaving the coal edge as they go up the incline to go through the spoil banks. Approximately 50 per cent of the total haulage road, a distance of one mile, for pits No. 1 and No. 2, respectively, is a minus 1.25-per cent grade from the highest point on the road on the spoil banks to the preparation plant hopper. Trucks from No. 1 and No. 2 pit use the same road for approximately the last 2500 ft.

High speed operation of the Euclid 32-ton trucks is obtained even under adverse weather conditions because of an excellent road maintenance program, good visibility, and a road width ample for two-way travel throughout.

A 20-ton coal hauler at Clinton Mine powered with a 150-hp Diesel.

TABLE 2

EUCLID COAL HAULERS

Truck Operating Cost—7¼-Hr Day, 220-Day Year

Units required	7	5
Model of unit	27FDT-72W	39FDT-95W
Capacity	20 ton	32 ton
Haulage distance (round trip)	6	4
Cycle time—90 per cent efficient	25.95	21.50
Number of trips, 7¼ hr	16.80	20.30
Total tons, 7¼ hr	336.00	650.00
Miles, 7¼ hr	100.80	81.20
Truck unit cost	$18,667.50	$25,935.00
Garage and shop tools (5-7 unit)	$15,500.00	$15,500.00
Diesel fuel	$4.96	$4.31
Motor oil	$.44	$.49
Transmission, differential, and general lubrication	$.17	$.17
Replacement parts	$3.06	$4.43
Tires and tubes	$9.58	$12.18
Garage labor	$5.43	$7.60
Truck operators	$15.34	$15.34
Depreciation:		
Truck unit	$17.00	$23.60
Garage and shop tools	$.67	$.94
Interest, taxes, and insurance—Truck units, garage, tools, and truck inventory	$3.37	$4.62
Fixed charges	$1.13	$1.58
Total	$61.15	$75.26
Cost per ton	$.1825	$.1155
Cost per ton mile	$.0304	$.0289

Study of Operations Provides Comparative Data

In referring to Table 2, actual cost per day's operation for both Euclid 32-ton and 20-ton coal-haulage truck. for given distances, is shown. Information for this tabulation has been obtained by actual time study of truck operation. The only correction necessary is the loading time of the truck. It is assumed that a 7½ cu yd coal-loading shovel is used to load both sizes of trucks. It might be well to point out in detail how the costs in this tabulation were determined.

Number of Units Required—A mine requiring output where seven 20-ton units or five 32-ton units are necessary to give desired tonnage is assumed.

Cycle Time—From actual time study.

Tons Per Unit Per Day—It is assumed the truck will operate 7¼ hrs per day and to haul rated capacity.

Truck Costs Per Unit—The Euclid Road Machinery Corp., Cleveland, Ohio, quotes vehicle price as of Feb. 15, 1948. The price is reduced five per cent for cash ten days.

Garage and Tool Cost—The truck garage at the Chinook mine is considered to be the latest word in storage and repair shops of its size for coal haulers. This garage is equipped to handle practically all repair work on the eight 32-ton trucks used at this mine. This garage is a steel fabricated building with concrete floor and overhead doors to permit the trucks to drive through. It is equipped with steam unit heaters and automatic temperature control. The steam for the unit heaters is obtained from the boilers in the preparation heating plant.

Fuel Oil—Records show the 32-ton truck to operate on a fuel consumption of approximately 2.8 miles per gal and the 20-ton truck to operate on three miles per gal. These amounts are the averages for several months operation.

Motor Oil—Each of the Diesel engines is equipped with a No. 750 Lubri-Finer. The changing of the oil in the crank case has been standardized to take place at the end of twelve 7¼-hr shifts and the changing of the oil filter element after 36 shifts. A normal amount of oil required to be added between changes is taken into consideration in determining the daily cost of motor oil.

Transmission, Differential, and General Chassis Lubrication—This information is based on changing the oil in the transmission and differential twice a year and a general lubrication of truck chassis twice a week.

Replacement Parts—The use of Euclid coal haulers and Cummins Diesel engines has been most successful. Past experience shows that it is best to base unit repairs and anticipated repairs on 6500 hr for the HB-600 engine before a complete motor overhaul. Four years represent 6390 hr, assuming a normal 220-day operating year. Average hourly

A 40-ton Euclid coal hauler with a 275-hp Diesel.

Two 32-ton capacity trucks equipped with 200-hp Diesel engines.

repair cost on this type of equipment, not including labor, is 34 per cent of the purchase price of the unit divided by 15,000.

The first fleet of Euclid 32-ton coal haulers for Ayrshire Collieries was placed in operation during December 1945. Although it has not been necessary to completely overhaul the engine on this size unit, it is believed the larger engine will require an overhaul at more frequent intervals than the smaller size. For this reason, an overhaul every two operating years is assumed. Average hourly repair cost, not including labor, for this size of equipment, is approximately 34.7 per cent of the purchase price of the unit divided by 15,000. Thus, the average hourly repair cost on the tractor and trailer unit is 60c for the 32-ton unit and 42.4c for the 20-ton unit.

Tires and Tubes—In order to obtain tire and tube cost per day, it is necessary to assume the normal average life of the tire and that the tube would be replaced when a new tire was installed. For practical purposes, it is assumed that 25,000 miles is the average life for all tires 16.00 by 24 in. and smaller and 35,000 miles is the average life for tires over 16.00 by 24 in.

Shop Labor—Two truck mechanics are employed for a fleet of five to eight trucks. One mechanic is employed on the day shift, which is the first shift, and the other on the second shift. The second-shift mechanic is on duty when the trucks are not in operation. In order to figure the correct shoplabor cost, the mechanic's vacation pay of $100.00 per year is added to his normal annual earnings. Earnings include some overtime pay at 1½ times the hourly rate. The garage mechanics work on other mine equipment as well, and it may be estimated that the time spent on such equipment more than compensates for additional labor that might otherwise be required from time to time to assist them on repairing coal-haulage equipment.

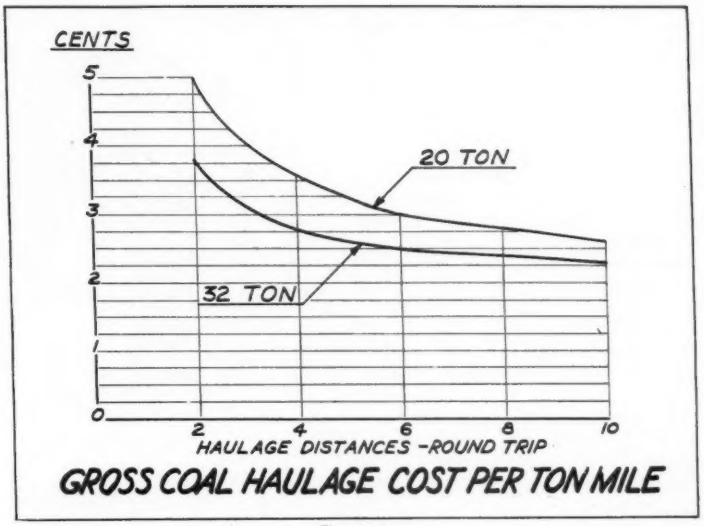

Figure 1.

Truck Operator—A normal day of 7½ hr has been assumed. To this a daily portion or 1/220 of his vacation pay of $100.00 has been added.

Truck Unit Depreciation—The truck unit is depreciated on the basis of 20 per cent per annum.

Garage and Tools Depreciation—In this connection, garage and tools are depreciated over a 15-year period.

Interest, Taxes, and Insurance—Each mining company probably uses a different method of determining the charges due to interest, taxes, and insurance. In order to establish this daily cost, consideration was given to the total initial investment of each truck, including garage and tools, and the average truck inventory per unit.

Fixed Charges—Without a doubt, the truck operation should be charged with a portion of the fixed overhead charge of the operating company. The portion of the daily fixed overhead charge which is chargeable against the truck operation used in this tabulation is determined by taking that percentage value of the coal haulage equipment of the total value of capital equipment as the ratio.

From this information it is a simple matter to calculate cost per ton and cost per ton mile. Note that for the 32-ton unit the cost per ton mile is 2.89c for hauling coal a distance of four miles round trip, and, for the 20-ton coal hauler, the cost per ton mile is 3.04c for hauling coal a distance of six miles round trip.

An International tractor—200 hp—used at Blackfoot Coal and Land Corp.

Large Trucks Give Lower Cost Per Ton

From this data, it is then possible to arrive at a cost per ton mile for Euclid coal haulage units of 32- and 20-ton capacity for various distances. Actually, from these particular operations one may obtain two values on each curve as shown by Fig. 1. Additional points on the curves are obtained by correcting haulage cycle time for loaded and empty trucks at a constant rate of speed, assuming this part of the haulage road to be a fairly level road. Actual maximum truck speed, loaded and empty, is not used but is reduced 20 per cent. The results thus obtained definitely show the 32-ton unit will haul coal more profitably than the 20-ton coal hauler for any distance where conditions are similar to those outlined.

Haulage - road construction and maintenance costs have been eliminated from the above operating cost per ton mile. Both of the coal hauling units referred to require well-constructed, well-maintained roads for satisfactory performance. Any coal hauling unit depends to a great extent on the condition of the haulage road for the time required to make a complete cycle. The larger unit, without doubt, requires somewhat better constructed roads and slightly higher road maintenance costs. The initial cost of the road construction should be proportioned to the life of the mine and probably road maintenance should be proportioned to an annual or daily charge. Experience has shown the 32-ton unit to require only a slightly higher road-maintenance-cost per ton mined in comparison to the 20-ton unit. At the various mines of Ayrshire Collieries, even though hauling coal with the same capacity unit, the haulage-road maintenance cost may vary from a minimum of 2c to a maximum of 5c per ton of raw coal hauled. Haulage-road construction and maintenance costs for the 32-ton truck would never be great enough to overcome the cost spread by which coal may be hauled in comparison with the 20-ton unit. The smaller unit has its place in the strip coal industry and will continue to be used for many years.

Haulage equipment trends, especially through Ohio, Indiana, Illinois, Kentucky, and Missouri, have been towards larger-capacity coal haulers, anticipating increased tons per unit at lower cost per ton mined. This statement may well be expressed by a composite graph, Fig. 2, showing annual sales of coal-haulage equipment to the coal stripping industry of one truck manufacturer from 1940 through 1947. During World War II, probably all coal mining companies, in their purchases of equipment, were forced to sacrifice design and size due to government restrictions even though the coal mining industry had a high priority rating.

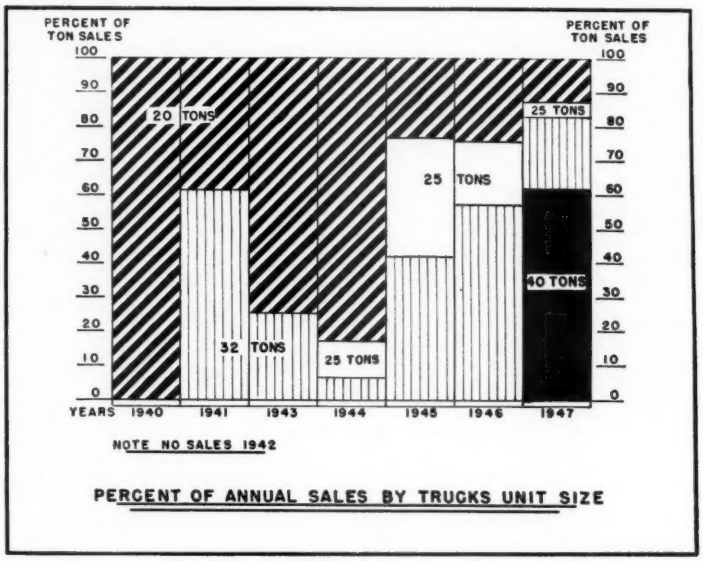

Figure 2.

Strip operators since 1945 have shown a definite preference towards the 30- to 40-ton coal-hauling units. This applies to mines using off-the-highway truck trailer units.

The strip mining industry welcomes competition of new manufacturers of coal-hauling vehicles. It is necessary to have equipment to transport additional coal more profitably due to shorter work days and increased labor costs. The truck manufacturers have always been capable of meeting our demands. Looking somewhat into the future, truck manufacturers may be expected to continue meeting requirements.

Modernizing the Aspen Tunnel

IN 1901 the Union Pacific Aspen tunnel in western Wyoming was completed. All westbound trains pass through the 5951-ft tunnel on Union Pacific's 1026-mile, double-track main line between Omaha and Salt Lake City.

In August 1947 work began on a new Aspen tunnel which will be completely double-tracked. Two years and $8,000,000 will be required to complete the job. Now 150 men are at work on this important project which will be 6700 ft long. The new bore is north of and approximately parallel to the Aspen tunnel. It is located at an elevation of approximately 7200 ft and passes under a 7660-ft spur of the Uintah Mountains. Modern equipment is being used throughout on the new tunnel. A three deck jumbo mounting nine rock drills is being used to drill the face as well as for the installation of steel and concrete lining. Two mucking machines work in conjunction with four electric and two Diesel locomotives and 45 cars to clean up the muck. Three stationary air compressors and a 500-cu ft portable air compressor supply the necessary compressed air to the mechanical equipment. Already 800 ft of tunnel have been completed.

Three-deck jumbo in the Aspen tunnel is used for drilling and for the installation of timber and steel.

The top men on the job are Harry Carleton, Lester Ashton, and Lowell "Blackie" Thomas. Mr. Carleton and Mr. Thomas are with Morrison-Knudsen who have the contract on the job. Mr. Ashton is the project engineer for the Union Pacific. The entire project is under the direction of W. C. Perkins, Union Pacific chief engineer at the company's Omaha headquarters.

1948

American
Mining Congress

Coal Convention

Cincinnati, Ohio

APRIL 26-28

T. G. GEROW
Executive Vice President
Truax-Traer Coal Co.
National Chairman, Program Committee

Program Committee

J. ROBERT BAZLEY
J. Robert Bazley, Inc.

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Harnischfeger Corp.

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P. P. KERR
New River & Pocahontas Cons. Coal Co.

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Blackfoot Coal & Land Corp.

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Joy Mfg. Co.

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D. B. MIKESELL
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F. E. MUELLER
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H. H. PANCAKE
American Car & Foundry Co.

C. B. PECK
Anaconda Wire & Cable Co.

R. A. REID
United Electric Coal Cos.

J. L. ROMIG
Atlas Powder Co.

G. A. SHOEMAKER
Pittsburgh Coal Co.

GEO. L. SMITH
Rochester & Pittsburgh Coal Co.

BRADLEY SPARKS
Luzerne-Graham Mining Corp.

A. R. STEPHAN
Mack-International Motor Truck Corp

H. A. TREADWELL
Chicago, Wilmington & Franklin Coal Co.

WHITNEY WARNER, JR.
Warner Collieries Co.

W. P. YOUNG
Bell & Zoller Coal & Mining Co.

25 YEARS ...of Coal Mining Progress

Current Problems and Future Prospects of Coal Will Be Probed April 26-28, at Cincinnati

FOLLOWING a year of outstanding performance by the coal industry and the men behind it, the 25th Annual Coal Convention of the American Mining Congress will couple up another car to the long train of technological achievement in coal mining. Headquarters for the 1948 Convention, to be held at Cincinnati, Ohio, will be the Netherland Plaza Hotel and April 26-28 will find the key men of the industry convening to consider recent developments and lay the ground work for still greater advancement.

Under the able chairmanship of T. G. Gerow, executive vice-president, Truax-Traer Coal Co., a capable Program Committee has selected for presentation at the Convention, an unusual series of papers, prepared by outstanding authorities in the field. New ideas have been grouped together for presentation to mining men in compact packages at the various sessions. These papers and the accompanying discussions will be of the highest practical value to operating men. Careful planning of the sessions has resulted in broad coverage of the problems of both deep and strip-coal mining. Operating men are encouraged to ask questions and to comment upon the papers presented, in order to obtain the maximum amount of valuable information on practices and means whereby greater efficiency is being attained at a wide variety of mining operations. Through these open forums, new ideas will develop that will make for even greater progress in the year ahead.

In order to lighten the Monday morning registration crowd, advance registration will take place on Sunday afternoon. While registration is taking place, and daily, before each session, a selected group of U. S. Bureau of Mines sound movies will be shown.

Special luncheons on Monday and Tuesday will be featured by timely addresses on subjects of particular concern to coal mining. On Monday, Shaw Livermore, consultant to the Congressional Committee on Foreign Aid, and widely known in coal circles, will discuss the impact of European recovery plans upon the coal industry. On Tuesday, H. A. Winne, vice-president in charge of engineering, General Electric Co., will talk on the industrial application of atomic energy. Mr. Winne, who is head of his company's nucleonic project and a member of the Consulting Board on Atomic Energy and the Technical Advisory Board of

Shaw Livermore
Luncheon Speaker
Monday

H. A. Winne
Luncheon Speaker
Tuesday

James D. Arrington
Guest Speaker
Annual Banquet

Carl T. Hayden
Sahara Coal Co.

J. T. Littlepage
Greenland Coal Corp.

V. O. Murray
Union Pacific Coal Co.

D. L. McElroy
Pittsburgh Consolidation Coal Co.

A. J. Ruffini
Powhatan Mining Co.

George M. Rigg
Weirton Coal Co.

E. R. Price
Inland Steel Co.

R. P. Koenig
Ayrshire Collieries Corp.

W. L. Burt
Greenland Coal Corp.

Session Chairmen

(Photo not available)
Wm. H. Cooke
Little Sister Coal Corp.

the War Department, is eminently qualified to explain developments in this field.

On the lighter side—to offset the intense business sessions—a Coal Miners Party will be held on Monday night. In an atmosphere of good fellowship, old and new friends will have a real opportunity to get together and join in the fun. Top-talent entertainers will add to the evening's festivities.

Each year the Annual Banquet—this time celebrating 25 years of coal mining progress—stands out as a highpoint of the Coal Convention. This year past coal presidents of the Mining Congress and past chairmen of Program Committees and of the Manufacturers Division will be honored for their leadership over a 25-year period in advancing the art of coal mining. James D. Arrington, well-known homespun humorist, will entertain the group in his unexcelled, sparkling style, and a program of high-class acts will round out the evening.

Chas. W. Connor
American Rolling Mill Co.
Chairman, Floor Committee

HARRY M. MOSES
President
H. C. Frick Coke Co.
Chairman, Coal Division

J. J. HUETHER
Assistant Manager, Industrial Divisions
General Electric Co.
Chairman, Manufacturers Division

Program

Monday, April 26

9:30 A.M.—Pre-Session Motion Picture—"Ohio and Its Mineral Resources"—A Premiere

10:00 A.M.—OUTLOOK FOR COAL

SESSION CHAIRMAN: T. G. GEROW, *Executive Vice President, Truax-Traer Coal Co.; National Chairman, Program Committee*

Coal Conservation

JAMES BOYD, *Director, U. S. Bureau of Mines*

Increasing the Utilization of Coal

DR. JOHN I. YELLOTT, *Director of Research, Locomotive Development Committee*

Synthetic Oil and Gas From Coal

CHARLES E. HEMMINGER, *Senior Engineering Associate, Standard Oil Development Co.*

●

12:30 P.M.—LUNCHEON

PRESIDING: HARRY M. MOSES, *President, H. C. Frick Coke Co.; Chairman, Coal Division, A. M. C.*

ADDRESS:

Impact of European Recovery Plans upon the Coal Industry

SHAW LIVERMORE, *Consultant to Congressional Committee on Foreign Aid*

●

2:30 P.M.—UNDERGROUND HAULAGE

SESSION CHAIRMAN: CARL T. HAYDEN, *Vice President, Sahara Coal Co.*

Belt Conveyors for Main and Gathering Service

C. W. THOMPSON, *Weirton Coal Co.*

Haulage System for Track-mounted Equipment

JOSE BOSE, *Supt., Templeton Coal Co.*

Combination of Track and Belt Conveyors

C. R. BOURLAND, *Asst. to Vice Pres., New River Co.*

●

2:30 P.M.—STRIP MINING

SESSION CHAIRMAN: J. T. LITTLEPAGE, *Greenland Coal Corp.*

Coal Stripping Legislation

R. T. LAING, *Mineral Producers Assn. of Pennsylvania*

Stripped Land Reclamation

J. W. BRISTOW, *Secy.-Treas., Illinois Coal Strippers Association*

DR. A. G. CHAPMAN, *Chief, Central States Forest Experiment Station*

T. C. CHEASLEY, *Sinclair Coal Co.*

LARRY COOK, *Executive Director, Ohio Reclamation Association*

OREL E. JOHN, *Vice President, Reclamation Development Co.*

L. E. SAWYER, *Director of Forestry and Reclamation, Indiana Coal Producers Association*

●

8:00 P.M.—COAL MINERS PARTY

●

Tuesday, April 27

9:30 A.M.—Pre-Session Motion Picture—"Sulphur"—A New Technicolor Film

10:00 A.M.—MANAGEMENT AND SAFETY

SESSION CHAIRMAN: V. O. MURRAY, *General Manager, Union Pacific Coal Co.*

Attracting Young Men to Coal Mining

K. L. KONNERTH, *General Manager of Operations, H. C. Frick Coke Co.*

Developing Supervisory Personnel

RUSSELL W. BEAMER, *Supt. of Training, Rochester & Pittsburgh Coal Co.*

Safety in Coal Mining

JAMES HYSLOP, *Executive Vice President, Hanna Coal Company*

●

12:30 P.M.—LUNCHEON

PRESIDING: J. J. HUETHER, *Assistant Manager, Industrial Divisions, General Electric Co.; Chairman, A. M. C. Manufacturers Division*

ADDRESS:

The Industrial Application of Atomic Energy

H. A. WINNE, *Vice President in Charge of Engineering, General Electric Co.*

MEET THE SPEAKERS

On Pages 46-49

2:30 P.M.—FACE PREPARATORY

SESSION CHAIRMAN: D. L. McELROY, *Vice President, Pittsburgh Consolidation Coal Co.*

Machine Cutting With Tungsten Carbide Bits
H. H. FLETCHER, *Vice President, Dickinson Fuel Co.*

Mechanical Kerf Cleaning
V. D. HANSON, *Mechanical Engineer, Pittsburgh Coal Company*

Drilling and Blasting With Airdox
R. L. ADAMS, *General Superintendent, Old Ben Coal Corporation*

Timber Setting and Recovery With Machines
GEORGE W. McCAA, *General Superintendent, Consolidation Coal Co. (W. Va.)*

Roof Support With Suspension Rods
C. C. CONWAY, *Chief Engineer, Consolidated Coal Company*

●

2:30 P.M.—MAINTENANCE

SESSION CHAIRMAN: A. J. RUFFINI, *Vice President, Powhatan Mining Co.*

Preventive Maintenance for Face Equipment
H. C. BEAN, *Superintendent, Walter Bledsoe & Co.*

Belt Care and Maintenance
J. A. BOTTOMLEY, *Assistant Mine Supt., Sahara Coal Company*

Power Distribution for Mechanical Mining
L. D. SINIFF, *Mechanical and Electrical Engineer, Consolidation Coal Co. (Ky.)*

●

2:30 P.M.—STRIP MINING

SESSION CHAIRMAN: WILLIAM H. COOKE, *President, Little Sister Coal Corp.*

Developments in Hauling Overburden
ALAN E. CODDINGTON, *Engineer, Carey, Baxter & Kennedy, Inc.*

Progress in Coal Haulage
LESTER E. BRISCOE, *Electrical Engineer, Ayrshire Collieries Corp.*

Earthborne Vibrations From Heavy Blasting
JULES E. JENKINS, *Vibration Measurement Engineers*

Wednesday, April 28

9:15 A.M.—Pre-Session Motion Picture—
"Magnesium—A Metal From the Sea"—A Premiere

9:45 A.M.—SURFACE PREPARATION

SESSION CHAIRMAN: GEORGE M. RIGG, *Vice President, Weirton Coal Co.*

What's New in Coal Preparation
HENRY O. ERB, *Preparation Consultant*

What Will the Industry Do About Fine Coal?
J. W. WOOMER, *Mining Engineer*

Refuse Disposal From Cleaning Plants
(a) Anthracite Methods—FRANK J. MEYER, *Division Engineer, Philadelphia & Reading Coal & Iron Co.*
(b) Appalachian Methods — STEPHEN KRICKOVIC, *Chief Engineer, Eastern Gas & Fuel Associates*
(c) Mid-West Methods—JOHN R. WILSON, *Preparation Manager, Union Collieries Co.*

●

1:30 P.M.—Pre-Session Motion Picture—
"Alloy Steels—A Story of Their Development"

2:00 P.M.—MECHANICAL MINING

SESSION CHAIRMAN: E. R. PRICE, *General Superintendent, Inland Steel Co.*

Low Coal Operation With Self-Loading Conveyors
P. R. PAULICK, *Consulting Engineer*

Thin Seam Mining With Conveyor-Loader
EVERETT ROBERTS, *General Superintendent, Tennessee Consolidated Coal Co.*

Continuous Mining by Combination Cutting and Loading Machine
STANLEY BLOSE, *Pres., Consolidated Coal & Coke Co.*

●

1:30 P.M.—Pre-Session Motion Picture—
"Sand and Flame"

2:00 P.M.—STRIP MINING

SESSION CO-CHAIRMEN: R. P. KOENIG, *President, Ayrshire Collieries Corp.*, and WILLIAM L. BURT, *President, Greenland Coal Corp.*

Hillside Stripping in West Virginia
HAROLD L. BAILEY, *Bailey Construction Corp.*

Draglines vs. Shovels in Deep Overburden
O. E. MAY, *Superintendent, Northern Illinois Coal Corporation*

●

7:00 P.M.—ANNUAL BANQUET

Celebrating 25 years of coal mining progress. Honoring Past Presidents and the Chairmen of previous Conventions and Expositions who have led the way in modernization of the coal industry.

TOASTMASTER: T. G. GEROW, *Executive Vice President, Truax-Traer Coal Co.*
GUEST SPEAKER: HON. JAMES D. ARRINGTON

Manufacturers Division

The American Mining Congress

*Allis-Chalmers Mfg. Co.
Alloy Steel & Metals Co.
*American Brake Shoe & Foundry Co.
American Manganese Steel Division
American Brattice Cloth Corp.
*American Car & Foundry Co.
American Chain & Cable Co.
*American Cyanamid Co., Explosives Dept.
American Mine Door Co.
Anaconda Wire & Cable Co.
*Atlas Powder Co.

Baker-Raulang Co.
Barber-Greene Co.
Bixby-Zimmer Engineering Co.
Bowdil Co.
Broderick & Bascom Rope Co.
*Brown-Fayro Co.
Bucyrus-Erie Co.

Cambridge Machine & Supply Co.
Card Iron Works Co., C. S.
Cardox Corp.

* Charter Members.

*Central Frog & Switch Co.
Central Mine Equipment Co.
Centrifugal & Mechanical Industries, Inc.
Chicago Pneumatic Tool Co.
Cincinnati Mine Machinery Co.
Cities Service Oil Co.
Clarkson Mfg. Co.
Colorado Iron Works Co.

D-A Lubricant Co., Inc.
Deister Concentrator Co.
Differential Steel Car Co.
Duff-Norton Mfg. Co.
*Du Pont de Nemours & Co., Inc., E. I.

*Edison, Inc., Thomas A.
Eimco Corp.
Electric Storage Battery Co.
*Elreco Corp.
Ensign Electric & Mfg. Co.
*Enterprise Wheel & Car Corp.

Fairmont Machinery Co.
Firestone Tire & Rubber Co.
Flood City Brass & Electric Co.

Gardner-Denver Co.
*General Electric Co.
*Goodman Mfg. Co.
Goodrich Co., B. F.
Gorman-Rupp Co.
Gould Storage Battery Corp.
Great Western Div., Dow Chemical Co.
Gruendler Crusher & Pulverizer Co.
Guyan Machinery Co.

Harnischfeger Corp.
Hazard Insulated Wire Works
Div. of The Okonite Co.
Helmick Foundry-Machine Co.
Hendrick Mfg. Co.
*Hercules Powder Co.
Hewitt-Robins Incorporated
*Hockensmith Corp.
*Holmes & Bros., Inc., Robert
*Hulburt Oil & Grease Co.

Independent Pneumatic Tool Co.
Ingersoll-Rand Co.
International Nickel Co.
Interstate Equipment Corp.
Irwin Foundry & Mine Car Co.
*I-T-E Circuit Breaker Co.

*Jeffrey Mfg. Co.
Johnson-March Corp.
*Joy Mfg. Co.

Kanawha Mfg. Co.
Kansas City Structural Steel Co.
Kensington Steel Co.
Koehler Mfg. Co.

LaBour Co., Inc.
Lee-Norse Co.
LeRoi Co., Cleveland Division
*Leschen & Sons Rope Co., A.
*Link-Belt Co.
Longyear Co., E. J.

*McGraw-Hill Publishing Co.
McLanahan & Stone Corp.
*McNally-Pittsburg Mfg. Corp.
Mack-International Motor Truck Corp.
Macwhyte Co.
Marion Power Shovel Co.
Mechanization, Inc.
Metal & Thermit Corp.
*Mine Safety Appliances Co.
Mines Equipment Co.
Mine & Smelter Supply Co.
Mosebach Electric & Supply Co.
Mott Core Drilling Co.
*Myers-Whaley Co.

National Electric Coil Co.
National Malleable & Steel Castings Co.
National Mine Service Co.
Nordberg Mfg. Co.

*Ohio Brass Co.
Ohio Oil Co.
Oliver Iron & Steel Corp.
Owens-Corning Fiberglas Corp.

Pacific Foundry Co., Ltd.
Paris Mfg. Co.
Penn Machine Co.
Pennsylvania Electric Coil Corp.
*Phillips Mine & Mill Supply Co.
Pittsburgh Gear & Machine Co.
Portable Products Corp.
Post-Glover Electric Co.
Precision Chain Co.
Productive Equipment Corp.
Prox Co., Inc., Frank

Quaker Rubber Corp.

Reliance Electric & Engrg. Co.
*Roberts & Schaefer Co.
*Roebling's Sons Co., John A.
Rome Cable Corp.

Safety First Supply Co.
Sauerman Bros., Inc.
Sheffield Steel Corp.
*Simplex Wire & Cable Co.
Simplicity Engineering Co.
*S K F Industries, Inc.
Stearns-Roger Mfg. Co.
Stephens-Adamson Mfg. Co.
Sterling Steel Casting Co.

Tamping Bag Co.
Templeton, Kenly & Co.
Texas Co.
*Timken Roller Bearing Co.
Tool Steel Gear & Pinion Co.
Traylor Engineering & Mfg. Co.
*Tyler Co., W. S.

Ultra-Violet Products, Inc.
Union Wire Rope Corp.
*United Engineers & Constructors, In.
U. S. Rubber Co., Wire Division
*U. S. Steel Corp. Subsidiaries

Vulcan Iron Works Co.

*Weir Kilby Corp.
Western Machinery Co.
*Westinghouse Electric Corp.
West Virginia Steel & Mfg. Co.
Worthington Pump & Machinery Corp.

The opening address of the Convention will be delivered by James Boyd, director of the U. S. Bureau of Mines, who will speak on coal conservation. As greater demands are placed upon the coal industry for the production of fuel and raw materials for the production of coke and synthetics, plus a multitude of other uses, the actual status of our coal reserves and an effective conservation program to permit their fullest recovery and utilization attain increasing importance. This is emphasized by the commitments we have made abroad to supply essential coal to reestablish and support European industry.

Following Dr. Boyd's address, Dr. John I. Yellott, director of research, Locomotive Development Committee, Baltimore, Md., will discuss the utilization of coal. He will, in turn, be followed by Charles E. Hemminger, senior engineering associate, Standard Oil Development Co., Elizabeth, N. J., who will outline developments in the production of synthetic oil and gas from coal. These papers, presaging the need for even greater coal production, are certain to hold the keen interest of all coal mine operators.

Monday afternoon sessions will be devoted to underground haulage and to strip mining, and those who are particularly interested in these subjects will split up and hold the two sessions simultaneously. At the haulage session, conveyors, track-mounted equipment, and combinations of both will be thoroughly considered by specialists in these fields. The

MEET THE *Speakers*

• JAMES BOYD, Director, U. S. Bureau of Mines, will keynote the Convention by an address on COAL CONSERVATION, stressing the need for higher mining efficiency and greater coal recovery.

• JOHN I. YELLOTT, Director of Research, Locomotive Development Committee, Baltimore, Md., will deal with laboratory research and practical experiments pointed toward INCREASING THE UTILIZATION OF COAL.

• CHARLES E. HEMMINGER, Senior Engineering Associate, Standard Oil Development Co., Elizabeth, N. J., in his paper on SYNTHETIC OIL AND GAS FROM COAL will forecast the future role that coal will play in supplying liquid and gaseous fuels.

• C. W. THOMPSON, Weirton Coal Company, Isabella, Pa., in discussing CONVEYORS FOR MAIN AND GATHERING SERVICE will point out the adaptability of this type of equipment to a wide range of mining conditions.

• JOE BOSE, Superintendent, Templeton Coal Co., Sullivan, Ind., in his paper on HAULAGE SYSTEM FOR TRACK-MOUNTED EQUIPMENT will describe modern coal mine transportation with locomotives and mine cars.

• C. R. BOURLAND, Assistant Vice-president, New River Co., Mt. Hope, W. Va., will show how a COMBINATION OF TRACK AND BELT CONVEYORS can be operated to utilize the advantages of each type of equipment.

• R. T. LAING, Mineral Producers Association of Pennsylvania, Kittanning, Pa., will discuss current and proposed COAL STRIPPING LEGISLATION in the various states as affecting the strip mining industry.

• K. L. KONNERTH, General Manager of Operations, H. C. Frick Coke Co., Pittsburgh, Pa., speaking on ATTRACTING YOUNG MEN TO COAL MINING will stress the need of the industry for training young men of character and ambition for future operators and executives.

• RUSSELL W. BEAMER, Superintendent of Training, Rochester and Pittsburgh Coal Co., Indiana, Pa., will outline methods for combining practical experience with special training for DEVELOPING SUPERVISORY PERSONNEL.

• JAMES HYSLOP, Executive Vice-president, Hanna Coal Co., St. Clairsville, Ohio, will discuss SAFETY IN COAL MINING, giving special emphasis to the joint responsibility that rests upon labor and management for accident prevention.

• H. H. FLETCHER, Vice-president, Dickinson Fuel Co., Charleston, W. Va., will show how MACHINE CUTTING WITH TUNGSTEN CARBIDE BITS has improved the face preparation and decreased the labor of bit changing.

J. W. Bristow
Illinois Coal Strippers Assn.

A. G. Chapman
Central States Forest Experiment Station

T. C. Cheasley
Sinclair Coal Co.

• V. D. HANSON, Mechanical Engineer, Pittsburgh Coal Co., Library, Pa., will present his experience with MECHANICAL KERF CLEANING, explaining how the "bugduster" eliminates hand shoveling behind the cutting machine.

• A Symposium on STRIPPED LAND RECLAMATION, giving an overall view of reclaiming and reforesting methods as applied to spoil banks and abandoned open pits, will be presented by members of the Land Use Advisory Committee.

• R. L. ADAMS, General Superintendent, Old Ben Coal Corp., W. Frankfort, Ill., will discuss DRILLING AND BLASTING WITH AIRDOX as a safe and effective method of breaking down the coal face during a working shift.

Larry Cook
Ohio Reclamation Assn.

Orel E. John
Reclamation Development Co.

L. E. Sawyer
Indiana Coal Producers Assn.

• GEORGE W. McCAA, General Superintendent, Consolidation Coal Co. (W. Va.), Monongah, W. Va., explains the operation of a comparatively new type of equipment in his paper on TIMBER SETTING AND RECOVERY WITH TRACKLESS MINING.

• H. C. BEAN, Superintendent, Walter Bledsoe & Co., Terre Haute, Ind., stresses the importance of PREVENTIVE MAINTENANCE FOR FACE EQUIPMENT showing how an organization should be set up to increase the productivity of machines.

• J. A. BOTTOMLEY, Assistant Mine Superintendent, Sahara Coal Co., Harrisburg, Ill., gives a comprehensive discussion on BELT CARE AND MAINTENANCE, outlining in detail the critical points to safeguard in an underground conveyor installation.

• C. C. CONWAY, Electrical Engineer, Consolidated Coal Co., Johnston City, Ill., presents a novel idea in coal mining, describing a technique of ROOF SUPPORT WITH SUSPENSION RODS that may prove revolutionary.

• L. D. SINIFF, Mechanical and Electrical Engineer, Consolidation Coal Co. (Ky.), Jenkins, Ky., shows the importance of following latest practices and using the best materials when installing a system of POWER DISTRIBUTION FOR MECHANICAL MINING.

• ALAN E. CODDINGTON, Engineer, Carey, Baxter & Kennedy, Inc., Tamaqua, Pa., will recount DEVELOPMENT IN HAULING OVERBURDEN in anthracite open-pit mining, tracing the progress from wheel scrapers of 60 years ago to present large capacity equipment.

• LESTER E. BRISCOE, Electrical Engineer, Ayrshire Collieries Corp., Indianapolis, Ind., in his paper on PROGRESS IN COAL HAULAGE will depict strip mine practices in certain localities, covering the equipment used, the operating methods, and discussing certain cost factors.

• JULES E. JENKINS, Vibration Measurement Engineers, Chicago, Ill., will deal with the subject of EARTHBORNE VIBRATIONS FROM HEAVY BLASTING, showing how seismograph measurements can accurately determine the surface effect of shocks from blasting overburden in open pit operations.

• J. W. WOOMER, Mining Engineer, Wheeling, W. Va., asks the question WHAT WILL THE INDUSTRY DO ABOUT FINE COAL? and analyzes the effect of certain determining factors, such as investment costs, wage scales, and market prices.

• HENRY O. ERB, Preparation Consultant, Terre Haute, Ind., will give an over all picture of WHAT'S NEW IN COAL PREPARATION, showing how operators and manufacturers are planning for coal to compete in price and combustion efficiency with other fuels.

Frank J. Meyer
Philadelphia & Reading Coal & Iron Co.

Stephen Krickovic
Eastern Gas & Fuel Associates

John R. Wilson
Union Collieries Co.

• DISPOSAL OF MINE WASTE AND WASHER REJECTS is becoming an increasingly serious problem due to the greater burden being put on coal preparation plants. A complete picture of how this problem is being met under various seam and mining conditions is given by speakers from three major fields.

• P. R. PAULICK, Consulting Engineer, Library, Pa., outlines how LOW COAL OPERATIONS WITH SELF-LOADING CONVEYORS are being developed as high coal reserves are approaching depletion.

• STANLEY BLOSE, President, Consolidated Coal and Coke Co., Denver, Colo., describes the latest development in coal mine mechanization—THE CONTINUOUS MINER—a machine, now past the experimental stage, which cuts and loads the coal in one operation.

• EVERETT ROBERTS, General Superintendent, Tennessee Consolidated Coal Co., Palmer, Tenn., analyzes the trend toward replacing hand shovellers with mechanical loaders in conveyor mining and tells his experience in THIN SEAM MINING WITH CONVEYOR LOADER.

• O. E. MAY, Superintendent, Northern Illinois Coal Corp., Wilmington, Ill., in his paper on DRAGLINES vs. SHOVELS IN DEEP OVERBURDEN, outlines methods of operation with each type of equipment in the effort to "move more earth, farther, and at less unit cost."

• Harold L. Bailey, Bailey Construction Corp., Pottsville, Pa., in his paper on HILLSIDE STRIPPING IN WEST VIRGINIA will explain basic principles of planning and operating sidehill stripping, particularly pertaining to the West Virginia areas.

American Mining Congress Officials

HOWARD I. YOUNG
President

JULIAN D. CONOVER
Secretary

G. B. SOUTHWARD
Program

P. D. McMURRER
Arrangements

H. L. MOFFETT
Publicity

other session will deal with important problems of legislation affecting coal stripping and progress in the reclamation of stripped lands.

Management and safety will be treated on Tuesday morning, along with the problems of attracting young men to coal mining and means of developing supervisory personnel. On Tuesday afternoon a session on face preparation will highlight the developments of the past year. The use of tungsten carbide bits; blasting with airdox; timber-setting machines and the newly-developed method of supporting the roof with suspension rods placed in drill holes which penetrate into firm, overlying strata, will come in for careful treatment by men who have had experience in these developments. Concurrently, sessions will be held on maintenance and on strip mining.

On the last day of the Convention, the morning will be devoted to the features of coal preparation. New innovations, the problems of fine coal, and refuse disposal will be considered in a series of outstanding papers.

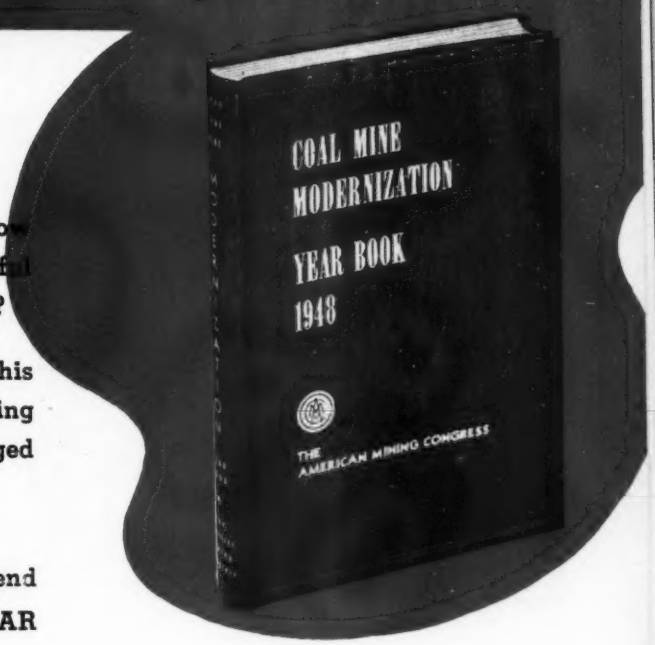
Wednesday afternoon, perhaps climaxing the series of exceptional technological papers, three papers will be presented on mechanical mining. Mechanical equipment applicable to thin-seam mining with self-loading conveyors and with conveyor-loaders will be amply discussed. For the first time, a newly-developed combination cutting and loading machine that permits continuous mining will be thoroughly described. Such equipment may be destined to attain wide application in seams that are of such thickness as to permit its use to lower production costs by offsetting the rising costs of labor and materials.

Also winding up the sessions on Wednesday afternoon, concurrently with the mechanical mining program, is the last of the strip-mining sessions. Draglines versus shovels in deep overburden and large-scale side-hill stripping will be analyzed by experts in treating these problems.

For the ladies, an absorbing program of entertainment has been arranged which is sure to prove diverting. In addition to the scheduled functions there will be every opportunity to see many of the points of interest in and around the city of Cincinnati.

Those who attend the 1948 Coal Convention will carry forward the progressive betterment of the coal industry that the American Mining Congress has always fostered and upheld.

Ask yourself two questions



1. Have you need for modern coal mining "know how"—can you use new operating ideas, helpful hints on increased efficiency and lower costs?

2. Would you like to have one big package of this "know how"—a handy book edited by leading coal mining men, well illustrated and arranged for easy use?

If your answers are YES, then we strongly recommend the 1948 COAL MINE MODERNIZATION YEAR BOOK.

The Year Book brings you the full proceedings of the 1948 Coal Convention—coal mining's annual forum on the latest developments in operating methods and equipment. It is the composite work of able executives, engineers and operating officials. Each has been selected by an industry-wide committee of mining men and manufacturers to discuss an important phase of coal mining at the Convention.

You get the best thought of the day on mining problems—information that you and your associates can put to work on the job. This isn't a story book! It's a fact-studded volume—prepared just for you—*practical and useful.*

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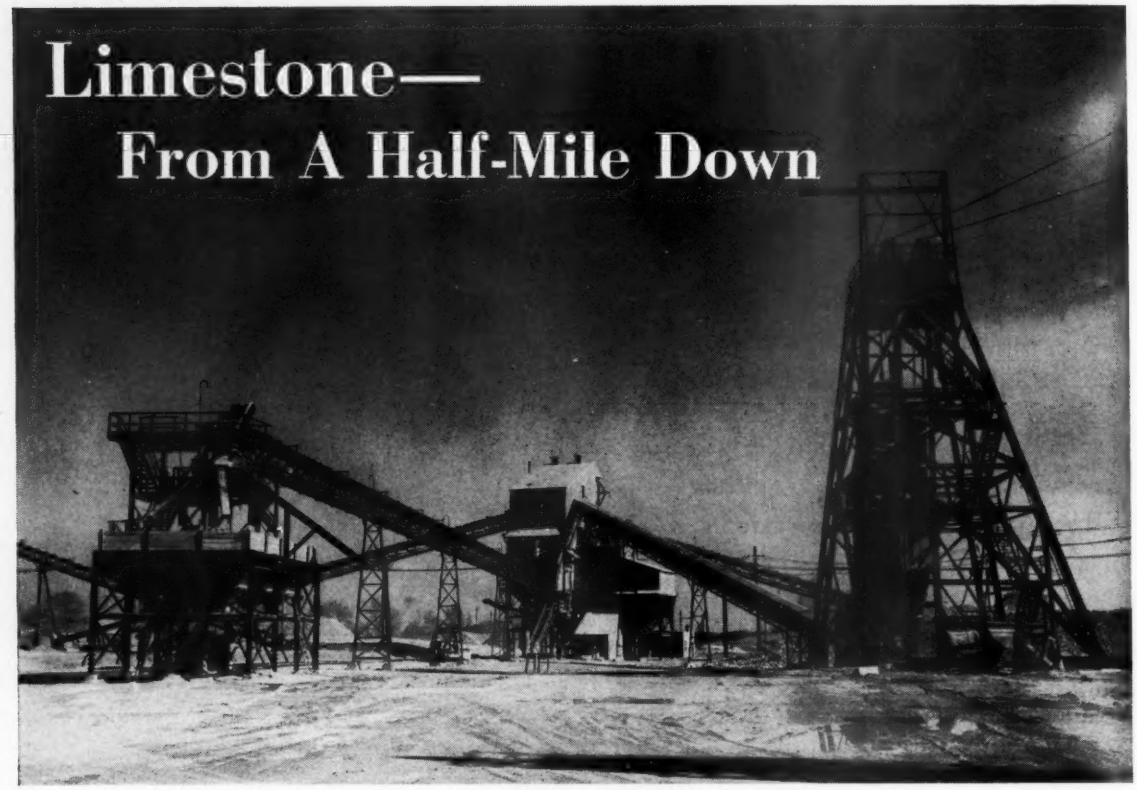
Limestone— From A Half-Mile Down



Conveyor belts carry the limestone to screening plant and kilns.

Mechanized Mine With Mammoth Equipment Produces at Rate of 300 Tons per Hour.

By R. E. PETTY
Columbia Chemical Division
Pittsburgh Plate Glass Co.

AT Barberton, Ohio, eight miles from the heart of Akron, is one of the world's deepest limestone mines. The mine, producing limestone from nearly a half-mile beneath the earth's surface, is operated by the Columbia Chemical Division of the Pittsburgh Plate Glass Co. to provide a local source of stone for Columbia's chemical plant located two miles away. Although fuel and most other raw materials were available at the plant, limestone, the bulkiest of them all, had to be brought in from distant quarries via lake vessels and rail. This meant not only high shipping costs but also involved stock piling enough stone during the summer to keep the chemical plant operating during the five or six winter months when the Great Lakes were frozen over.

Consequently it was decided that underground mining of stone at Barberton would compare favorably with existing costs and would provide an adequate supply of limestone for

Barring down prevents accidents from falling slabs. This rig can clean a 46-ft back.

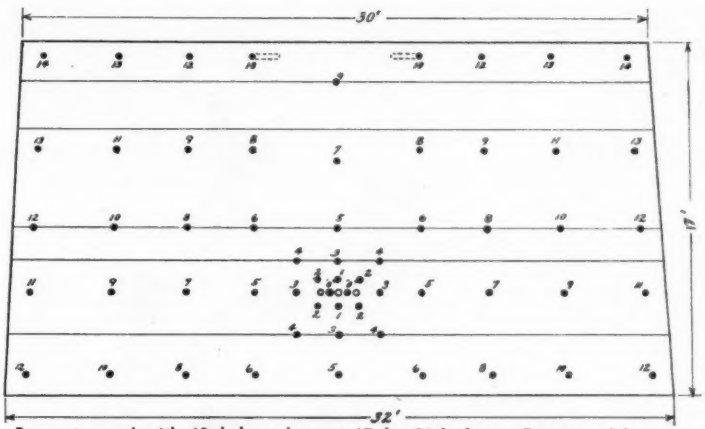
the chemical plant. Early in 1941 the E. J. Longyear Co., under contract with Columbia, began sinking two shafts down to a limestone deposit through which Columbia had drilled many salt wells in their years of previous chemical production at the Barberton plant. Each shaft is 8 by 17 ft in section and they are 550 ft apart. No. 1 shaft, for hoisting stone only, was hand mucked, but during the sinking of the No. 2 service and supply shaft a clamshell rig was developed which is now known as the Riddell Shaft Mucker. Most of the 2197 ft down to the top of the limestone was in shales and it was necessary to concrete both shafts the entire distance except for 100 ft of No. 1 that was in solid sandstone.

Below the shales are 5 ft of Delaware limestone and 215 ft of Columbus limestone of Devonian age. Only the top 46 ft of the Columbus limestone is of sufficient chemical purity to warrant mining, so the mine floor was established at 2248 ft below the surface and development work was begun. However the shafts continue on down to 2323 ft and 2258 ft respectively to facilitate cage and skip operations. The stone itself is a massive gray limestone averaging about 92 per cent calcium carbonate. Thin horizontal shale and stylolitic partings occur from 7 in. to 6 ft. apart dividing the stone into distinct seams and providing excellent roof and floor levels.

Large Rooms Produce High Tonnage

As the seam is flat-lying and the numerous partings would give favorable roof and floor conditions, the room-and-pillar method of mining was adopted. Double entries are now driven 17 ft high by 24 ft wide by advancing a 9 by 24-ft heading and then taking the 8 by 24-ft bench with down holes. A V-cut round is drilled with drifters on column-and-arm mountings and two portable scraper-slides handle the loading of stone in these entries. Theses slides were designed at the mine to fit this particular operation. They consist of a 50-hp, three-drum electric slusher hoist and a steel ramp mounted on caterpillars. A 5-ft scraper is used. With one pull rope and two return ropes on the slusher, the operator can clean out the entire 24-ft width of the heading and pull the stone up the steel ramp and drop it into the trucks. The caterpillars facilitate moving the unit back away from the face when blasting and returning it as close as possible for more economical mucking.

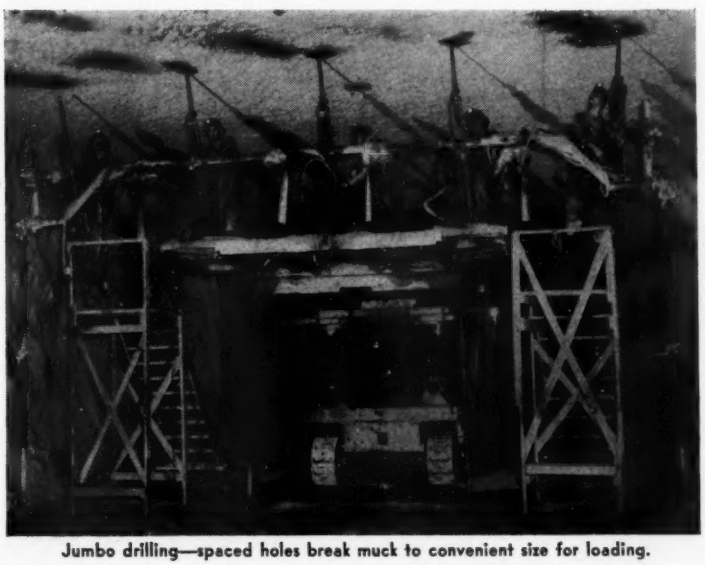
Both rooms and single entries are driven 17 ft high by 32 ft wide. Rooms are 600 ft long and are 75 ft from center-to-center. Pillars are cut with 20-ft wide breakthroughs every 180 ft to help keep the air circulating close to the working face and to aid in getting equipment from one room to the next.



Burn-cut round with 63 holes advances 17 by 30-ft face. Fourteen delays are used as indicated.

A 63-hole "burn-out" round is now being drilled to advance these rooms. This round was developed at Barberton to produce a maximum advance per round and still leave the stone piled close to the face for easier loading. Besides these features, it is designed to take full advantage of the partings and still have no drilling in the harder layers. Fragmentation also had to be considered as the chemical plant can only burn plus 1-in. stone in its vertical kilns and fines must be kept to a minimum. To help the drillers correctly spot their holes for this round, a lantern slide of the pattern was prepared. This pattern is projected on the face with a standard slide projector operated by four 6-volt storage batteries and a paint mark is put on the face at each hole, quickly and accurately marking off the entire round for drilling.

All drilling is wet, using 1¼-in. round hollow drill steel and Ingersoll-Rand detachable bits. Both bits and steel are sent up to the surface blacksmith shop for hot-milling, forging and heat-treating.


Jumbo drilling—spaced holes break muck to convenient size for loading.

Jumbos Do Bulk of Drilling

At present the 21 closely spaced cut holes are drilled from Cleveland wagon drills and the remainder of the holes from "Jumbo" drilling units. One jumbo carries two Ingersoll-Rand 505 drifters on column-and-arm mountings on each of three decks. It is on crawlers and is electrically powered. The other jumbo is a two-deck unit on a Mack truck chassis. On each desk are two Cleveland MDR Jumbo booms with Gardner-Denver CF 89 drifters. Its electric motor and pneumatic tires make it an excellent rig for getting around the mine.

As each round is drilled ahead,

three short vertical holes are drilled into the roof to bleed out a small amount of gas which, being under great pressure, is thought to be responsible for some previous roof falls. The gas apparently accumulates at high pressures and forces thin slabs of roof stone down.

After the rooms are completed 32 ft wide, 17 ft high and 600 ft long, an additional 11 ft of stone is stoped from the roof by drilling holes at 20 deg from the vertical from another jumbo. This jumbo has five Gardner-Denver CF 79 drifters equally spaced across the width of the room on a bar. The bar is supported by four Cleveland Jumbo booms on the hinged platform of this caterpillar mounted unit. The five machines permit the entire width of the room to be drilled at once. When not needed for stoping, the bar is removed from this jumbo and four drifters are mounted directly on the Cleveland booms for drilling room faces. The hinged platform permits drilling the entire height of the face.

Unusual Feed Permits Deep Hole Drilling

Another adaptation of this jumbo is to drill 42-ft holes using coupled drill steel to stope down 29 ft of stone or a total height of 46 ft above the mine floor in one operation. Hexagonal drill steel of ⅞-in. zinc is used here to reduce the weight of the steel. A double-length feed is used in this operation to reduce drill-changing time by mounting an entire automatic-feed drifter on the automatic-feed of another machine.

Blasters charge the faces on the second shift only and shoot only after everyone except the blasting crew is out of the mine at the end of the shift. The entire 63-hole round is fired at the same time with 14 delays of Hercules electric blasting caps from a special 220-v blasting line. The blasting foreman has close supervision over the blasting crew at all times and personally throws the switch for blasting. A 40 per cent semi-gelatine dynamite is used. A diesel-powered utility truck with a double-deck platform, used for hauling supplies on the first shift, serves as scaffold and powder truck in charging these high faces and stope holes.

In both rooms and stopes full-revolving, 1½-cu yd Marion electric shovels load out the stone. Eight diesel-powered Koehring Dumptor trucks, carrying 7-ton loads, haul the stone to the underground crushing station bin. The Koehrings have three speeds forward and three in reverse and an "instantaneous" gravity dump which makes them adaptable to this shuttle service between the shovels and the crusher. Three trucks serve each shovel while the others are being serviced or are hauling from the scraper slides. A new Joy 16-hp hard rock loader has just been purchased and is being used in the rooms.

Unique Scaler Cleans High Backs

Among the utility equipment underground is a small electric shovel base rigged with a boom and cage from which scalers can reach all corners of the faces to pry down loose rock before the drillers set up. This outfit has a telescoping boom that can be extended to reach the contemplated 46-ft high stope roofs. An Allis-Chalmers diesel bulldozer handles road maintenance and cleaning up at the face after blasting, and another diesel Cletrac tractor is rigged to handle several of these jobs. It is equipped with an overhead loading bucket for loading stone into the Koehrings, or it can be used to supplement the bulldozer by attaching a blade. In addition, Columbia built a small cage which is easily attached ahead of the loading bucket to hold scalers up to these 17-ft high faces for prying down loose rock.

Electrically-operated 1½-yd shovels load the muck into Diesel-driven dump trucks.

Primary Crushing Underground Sizes Muck for Hoisting

Of special interest to many mining men is the underground primary crusher in closed circuit. Trucks hauling from the face dump the stone into a 50-ton hopper from which a Ross chain feeder feeds it into the jaw crusher. This crusher, an Allis-Chalmers 48 by 60 in., has special corrugated jaws for better breaking of the slabby pieces. It discharges onto a belt conveyor system which raises the stone to a 6½-in. scalping screen. The oversize stone returns to the crusher bin for recrushing via a chute and a horizontal belt conveyor.

The minus 6½-in. stone falls into a 400-ton surge bin directly below the screen prior to hoisting to the surface. In the chutes between the surge bin and the skips are 250-cu ft measuring pockets which put the correct load in each skip. Opening the upper guillotine-type gate allows the stone to fill the pocket. When this is closed, the lower arc gate can be opened and the ten tons of stone slide down the chute and into the skip.

Balanced hoisting is applied, with two ten-ton capacity skips operating on a 15-ft 10-in. diam bicylindroconical drum. Though the hoist may be operated manually, all regular stone hoisting is automatic. The skip loader merely pulls a starting switch when the skip is full, and a series of six coupled exciter motors accelerate, decelerate, and stop the hoist. When operating at full speed, about two minutes are required per trip. Lilley hoist controls are used on both this hoist and the smaller service hoist.

Surface Plant Sorts Out Undersize

The primary objective of the mine is to produce stone of minus 6½-in. plus 1 in. size for the chemical plants vertical kilns. All minus one-inch stone, about one-third the total production, is sold locally as agricultural limestone and commercial aggregate. With these facts in mind, an

elaborate surface screening plant was erected.

Kiln stone is classified into two sizes and can be shipped directly to the chemical plant via an electric lorry and car or can be trucked to a stock pile and reclaimed with a Kern radial storage unit.

All undersize stone can be screened to six different commercial varieties and stored in a second Kern radial storage from which it is reclaimed and blended to meet the customers' orders. Or, all or part of the minus one-inch stone can be put through either of two hammer mills to produce the more popular smaller commercial varieties. All commercial stone is sold locally via truck or rail. Shipments can be made either from stock or from the mine production.

Safety Provisions Reduce Lost Time

Unlike most mines, the main cause of accidents at Barberton is not falling roofs, dust explosions, or gas, but the more common industrial accidents that accompany any highly mechanized plant. Though no timbering is used in regular operations, roof falls are not a serious problem and the industrious work of the scalers keep the loose stone from falling from the walls. A small amount of gas is found in some of the stope holes, but is not of sufficient quantity to be a major factor. The miners wear hard hats at all times underground and carry their electric lamp with its cord to a battery on their belt. Each man gets a chest X-ray at least every six months at the company hospital. The foreman supervises first-aid underground and night superintendents handle it on surface.

Power for the shovels and the primary crusher underground and the main stone hoist is supplied at 2300 v. Most of the other electric equipment operates on 440 v. In general, diesel is used where great maneuverability is desired and electricity for more or less stationary power.

Ventilation air is forced down the service shaft at the rate of 80,000 cfm, is circulated around the working areas by the use of brattices and draft doors, and returns up the stone shaft. The average underground temperature is about 77 F while the actual rock temperature is about 83 F. The vast amount of air circulated underground is sufficient to reduce the concentration of fumes from the 11 diesel units to an insignificant amount of dangerous gases and only a noticeable odor. Booster fans are used in many of the headings to increase the velocity of the air for more comfortable working conditions.

Skilled carpenters, mechanics, electricians, boilermakers, welders, and pipe fitters handle almost all underground maintenance in their underground shops and out in the mine. Similar shops are set up on surface to handle screen plant and other outside repairs. Special jobs can be sent into the chemical plant for completions in their more elaborate shops. Including both surface and underground operations a total of 180 men, working two eight-hour shifts, five days a week, operate the plant to produce approximately 300 tons per hour.

Mobile platform speeds up the work of blasting crews.

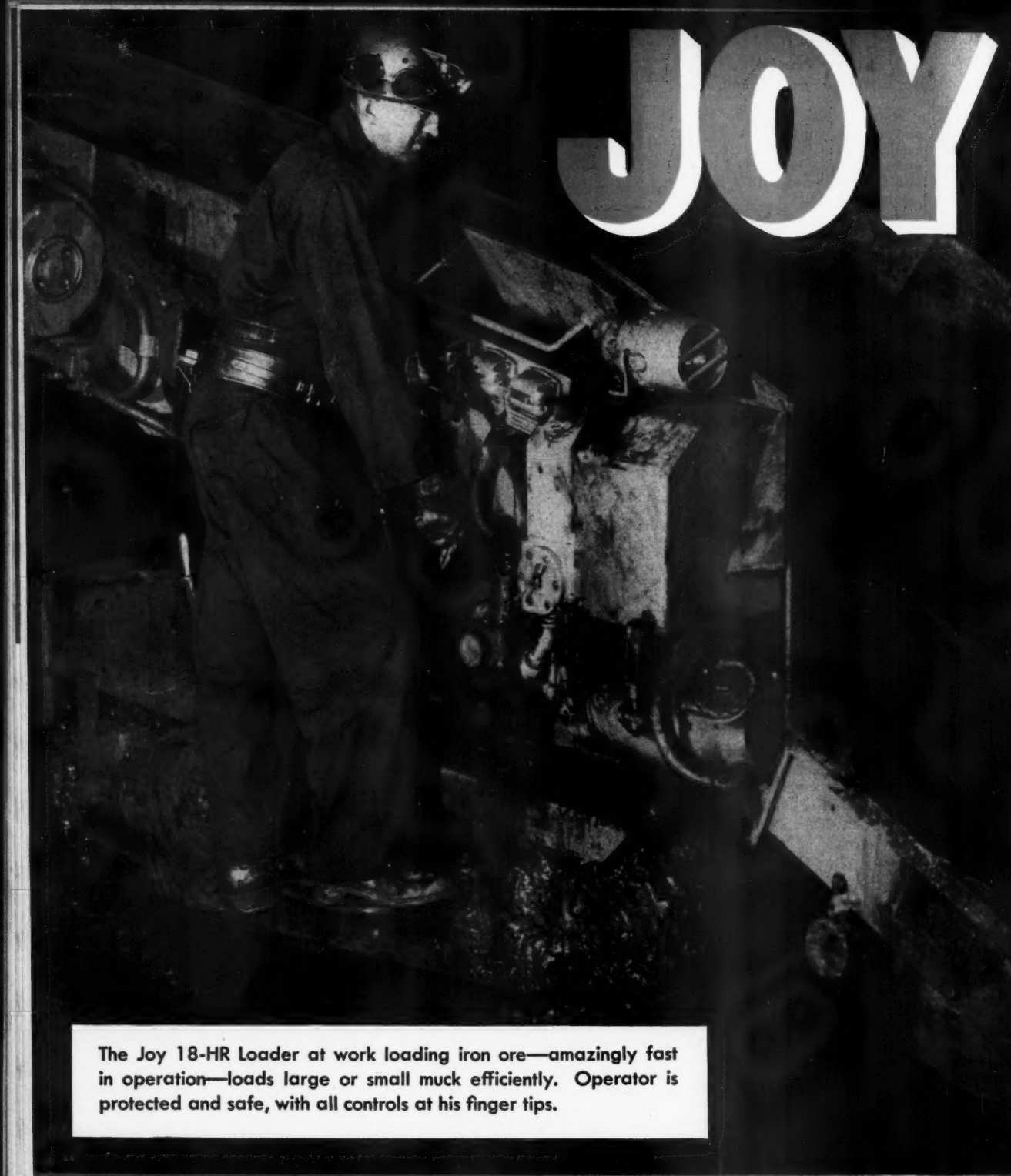
Unlike most mines, entries present "wide-open space" appearance.

Plan Now to Attend

Metal Mining Convention and Exposition

San Francisco, Calif.

September 20-23, 1948



The Joy 18-HR Loader at work loading iron ore—amazingly fast in operation—loads large or small muck efficiently. Operator is protected and safe, with all controls at his finger tips.

The modern way to control costs — increase tonnage!

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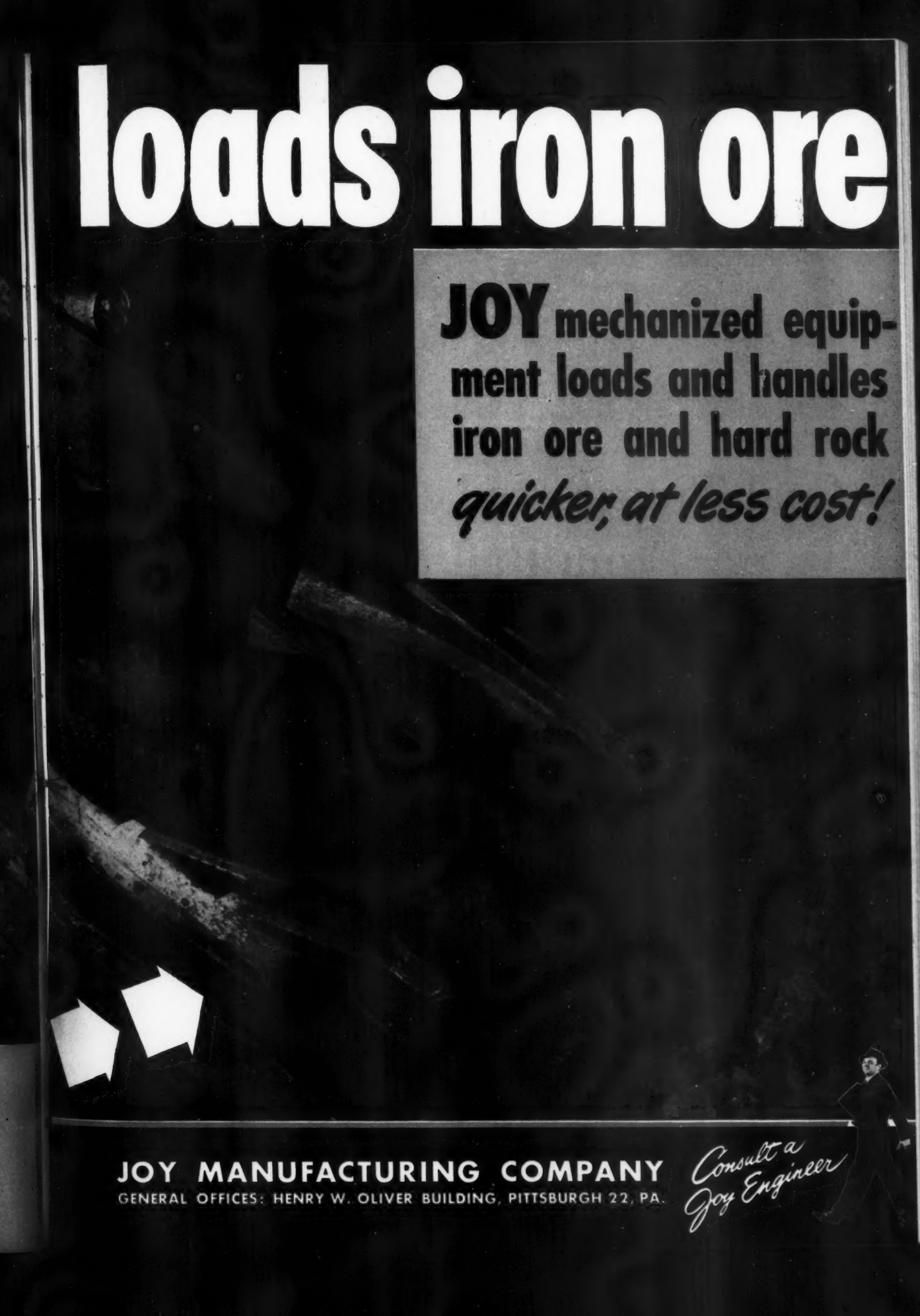
JOY mechanized equipment loads and handles iron ore and hard rock *quicker, at less cost!*



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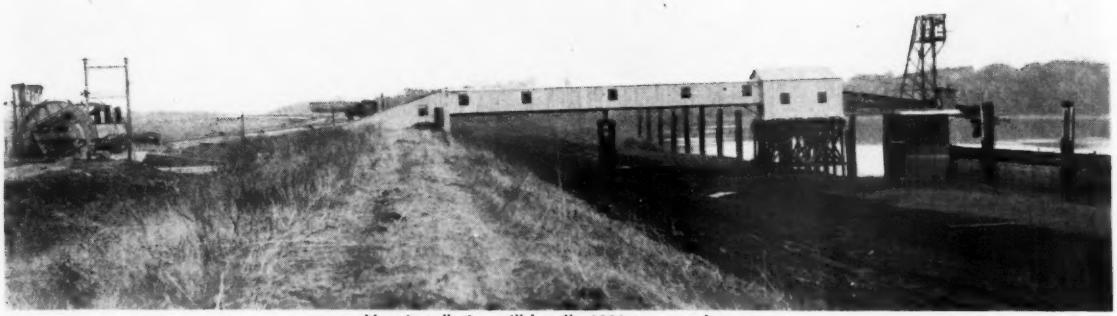


New installation will handle 1000 tons per hour.

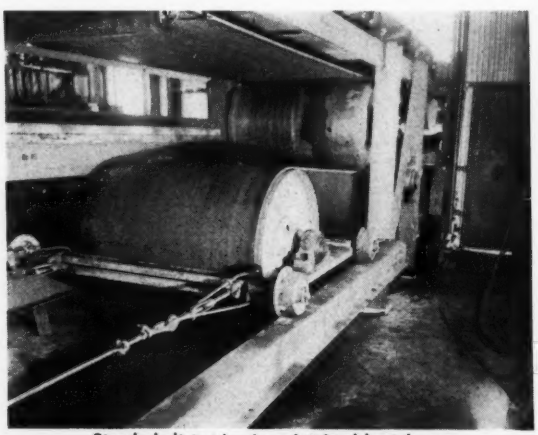
Coal Transferred From Rail to River

Modern Coal-Handling Equipment Installed by Truax-Traer Takes Coal from Railroad Cars to River Barges.

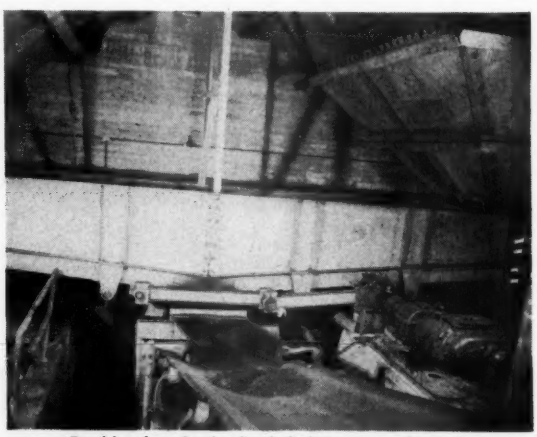
ON the Illinois River near Liverpool, Ill., the Truax-Traer Coal Co. has installed a station to transfer coal, produced at their Fulton County operations, from railroad cars to barges for shipment on the Illinois River. The Burlington Railroad has constructed a spur track from Lewistown, Ill., to this transfer point for serving this installation.

East of Lewistown, Ill., the spur takes off and runs about nine miles in a southeasterly direction to the loading point. The yard is a gravity yard consisting of three load tracks above the rotary car dump with a capacity of 70 cars and four empty tracks below the car dump with a 70-car capacity. Cars are dropped onto the rotary car dump by gravity and leave the dump in the same manner. The grade on the load tracks is 1.3 per cent and the grade on the first half of the empty tracks is 2 per cent, easing off to zero grade on the lower half of the empty yard. The railroad run-around track extends to the upper end of the load tracks to permit pulling the loads into the yard.

The transfer station consists of a rotary car dump, two 100-ton capac-



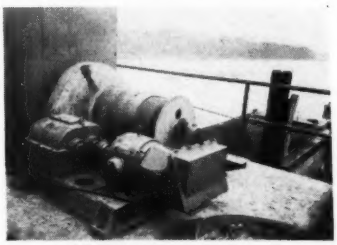
Steady belt tension is maintained by take-up.



Double plate feeder loads belt conveyor from two 100-ton hoppers.

ity twin hoppers, two reciprocal feeders with remote control for regulating the feeder speed, and 337 ft of 48-in. belt conveyor. The belt conveyor is on an 18 deg incline from the feeder to the top of the levee, an incline distance of 133 ft. It is horizontal for approximately 150 ft to the back end of the loading boom. The boom is 55 ft long and can handle fluctuations in the river level up to 25 ft. At the end of the boom and suspended on the shaft carrying the head pulley is a swivel chute that can rotate 360 deg for barge loading and trimming.

Two "A" frames resting on two caissons of sheet steel piling 15 ft in diameter and covered with concrete 16 in. in thickness support the boom. These caissons are gravel filled and



Electric hoist moves barges while loading.

Rotary dump places coal in hoppers for belt conveying to river barges.

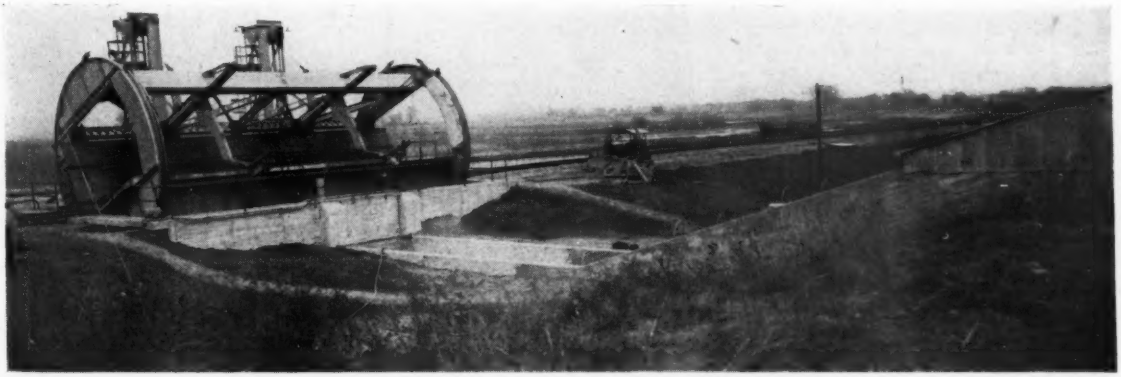
are tied together with a semicircular caisson, the top of which is 10 ft below the top of the main caisson. This caisson supports the boom guides and stabilizes the main caissons.

The barge shifters are located on the main caisson, one shifter at about the center of each caisson. The operator's cab is also located on the downstream main caisson.

Operation of the rotary car dump is independent of the other units. The operator is located at the dump where he can watch the oncoming loads and the empties as they leave. He can also watch the car clamps, cables, and the hopper. The remainder of the plant is controlled from the operator's shanty located on the river caisson. The belt is driven from a point approximately 60 ft back of the head shaft of the boom. This drive house contains the automatic belt take-ups, the belt drive, and the switch gear for all motors for the plant, except the rotary dump. The control panel for everything except the dumper is in the operator's cab on the river caisson. The operator here can control the speed of the reciprocating feeders, on and off controls for the belt, swivel chute, boom hoist, and barge shifters. The swivel chute and boom hoist are reversible as are the barge shifters.

Dolphins or pile clusters extend 700 ft up and downstream from the main caissons and are on 54-ft centers. The clusters holding the barge rope sheaves are 250 ft up and down stream from the main caissons. The dolphins are spaced to store 12 empty and 12 loaded barges by tying the barges four abreast and still provide enough room for loading and trimming a barge.

At present the capacity of the belt is 500 tons per hr, but this can be doubled by speeding up the belt. The rotary dumper has a potential capacity of 20 cars per hr. Currently, the dock is being operated at 500 tons per hr.



Dump capacity is a car every three minutes.

Famous for Safety and Service . . .

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PARALLEL MINING CABLE

- **Cuts Short Circuits**
- **Meets Pennsylvania Flame Test**
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- **Meets Bureau of Mines diameter specifications**

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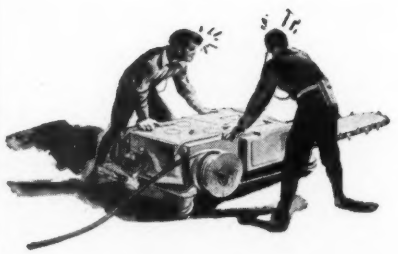

. . . Assures uninterrupted mine operation

*Reg. U. S. Pat. Off.

ANACONDA from mine to consumer

ANACONDA WIRE AND CABLE COMPANY

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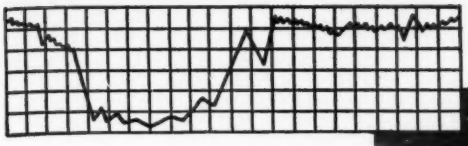
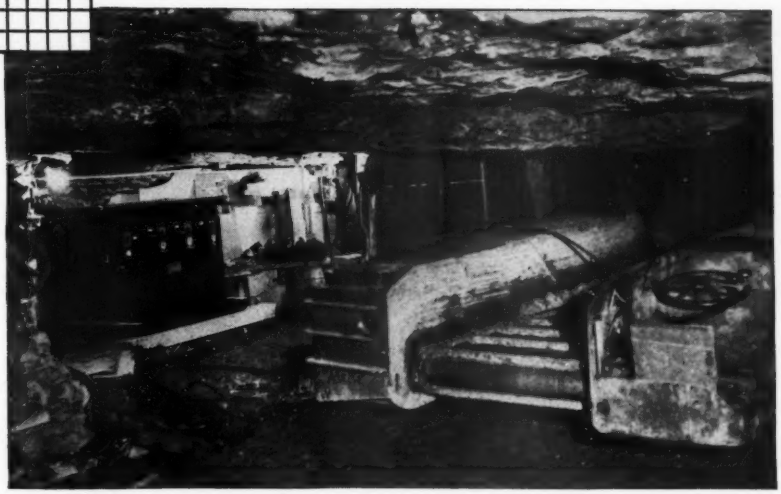


OFF-PEAK POWER

keeps them *CHARGED*



SIX OR SEVEN hours of charging per day during the off-peak period . . . that's normally time enough for full recharge of the batteries that operate your mine haulage equipment—*provided they are* EDISON *Nickel-Iron-Alkaline Batteries.* The reason: EDISON Batteries can be charged day after day at an average of their normal rate without injury.

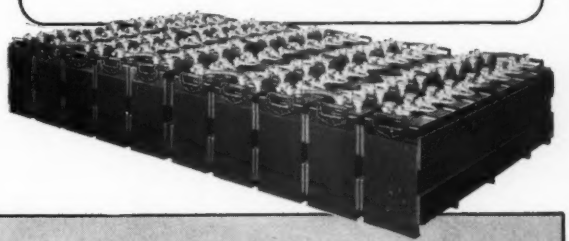
In addition, they require no critical adjustment of the charge rates. That means that you can charge them directly from the d-c power lines through suitable resistors.

EDISON Nickel-Iron-Alkaline Batteries have many other built-in advantages: their rugged steel construction inside and out withstands rough usage; their electrolyte, an alkaline solution, is a natural preservative of steel; their electrochemical principle of operation is free from self-destructive reactions. That's why they stay on the job, out of the repair shop. That's why they cut annual operating cost and give longer service life than any other type of battery.

Specify EDISON and you specify maximum reliability—enduring quality.

In Mine Locomotives and Shuttle Cars EDISON Nickel-Iron-Alkaline Batteries Give You These Important Advantages

- ★ They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- ★ They are **foolproof electrically;** are not injured by short-circuiting, reverse charging or similar accidents; are free from self-deteriorating reactions.
- ★ They can be **charged rapidly;** do not require critical adjustment of charge rates; can be charged directly from mine d-c supply.
- ★ They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.
- ★ They can **stand idle indefinitely** without injury, without attention, and without expense.
- ★ They are **simple and easy to maintain.**



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STORAGE BATTERIES

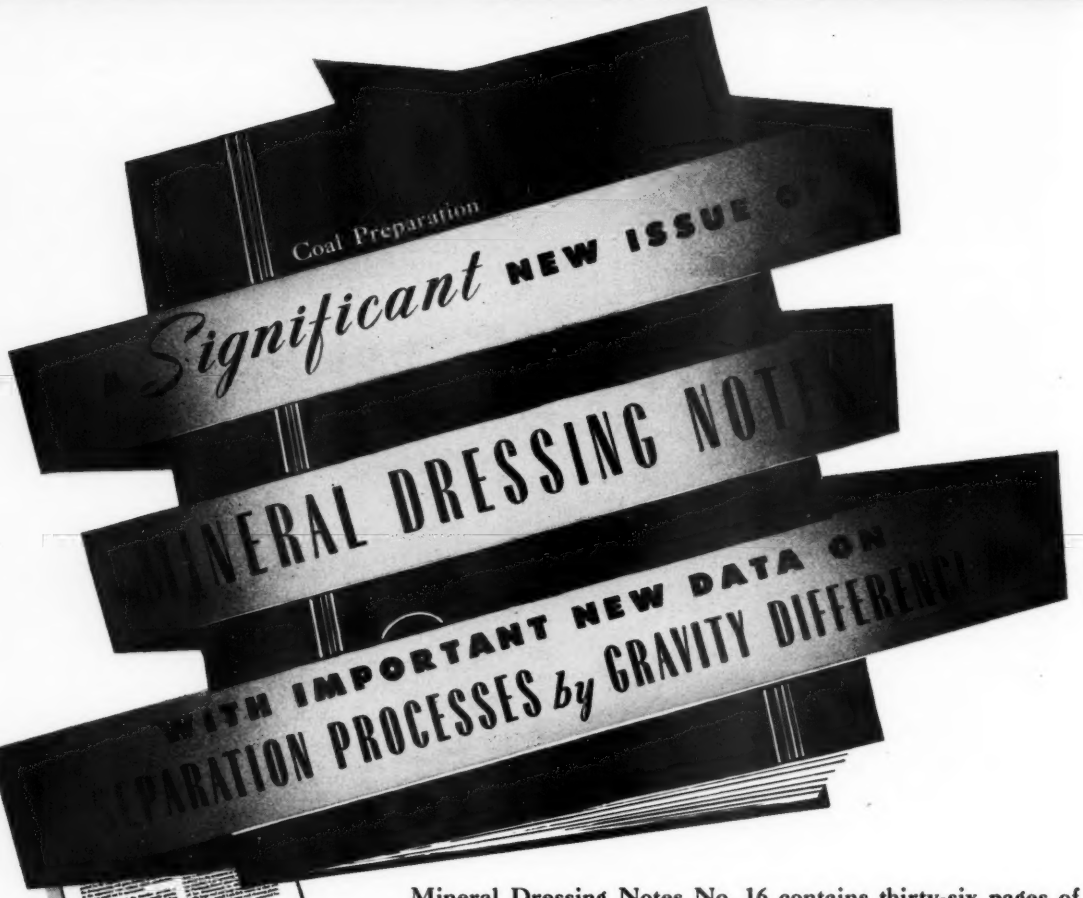
EDISON

STORAGE BATTERY DIVISION

of Thomas A. Edison, Incorporated

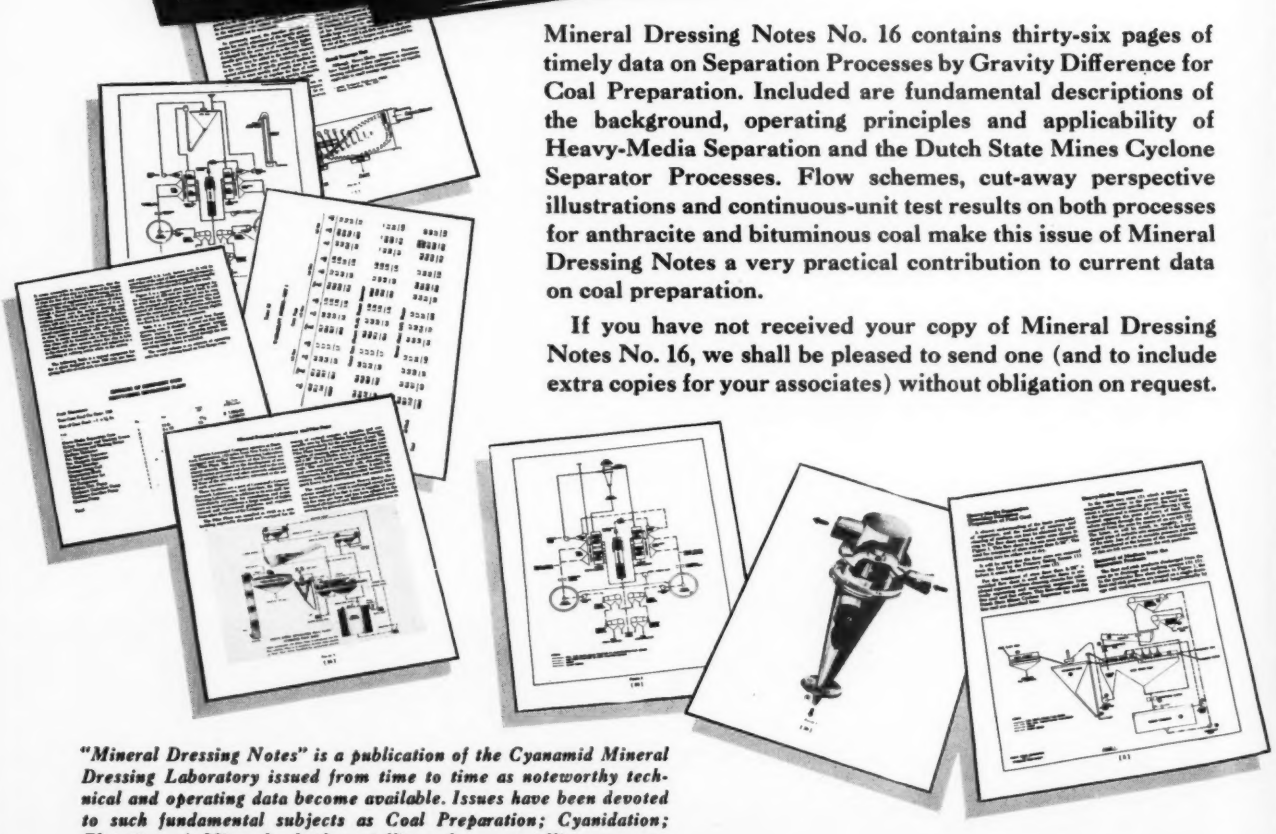
West Orange, N. J.

IN CANADA: International Equipment Co., Ltd., Montreal and Toronto



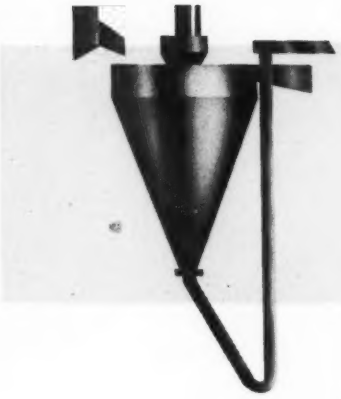
Mineral Dressing Notes No. 16 contains thirty-six pages of timely data on Separation Processes by Gravity Difference for Coal Preparation. Included are fundamental descriptions of the background, operating principles and applicability of Heavy-Media Separation and the Dutch State Mines Cyclone Separator Processes. Flow schemes, cut-away perspective illustrations and continuous-unit test results on both processes for anthracite and bituminous coal make this issue of Mineral Dressing Notes a very practical contribution to current data on coal preparation.

If you have not received your copy of Mineral Dressing Notes No. 16, we shall be pleased to send one (and to include extra copies for your associates) without obligation on request.



"Mineral Dressing Notes" is a publication of the Cyanamid Mineral Dressing Laboratory issued from time to time as noteworthy technical and operating data become available. Issues have been devoted to such fundamental subjects as Coal Preparation; Cyanidation; Flotation of Minerals, both metallic and non-metallic; etc., etc. This helpful publication is sent without charge, upon request, to metallurgists, coal preparation engineers and others interested in more efficient treatment of metallic and non-metallic minerals.

HEAVY-MEDIA SEPARATION PROCESSES



Precision cleaning over a full-size range with inherent advantages over previous preparation methods in cleaning coal with a high-percentage of near-gravity material. Extremely accurate on coal with a high and variable percentage of refuse. Functions efficiently at any desired gravity from 1.25 to 3.40. Gravity of the medium can be maintained within ±0.01 and quickly and easily adjusted as feed-coal changes. Low medium loss because of continuous automatic recovery and re-use of medium. Plants can be designed for multiple-product separation from run-of-mine feed in a full size-range to meet any present or future specification in any market. Equipment is standard and time-proved. Plants can be started or shut down without bank-loss of coal or medium or change in plant efficiency. Labor costs are low.

DUTCH STATE MINES CYCLONE SEPARATOR PROCESSES

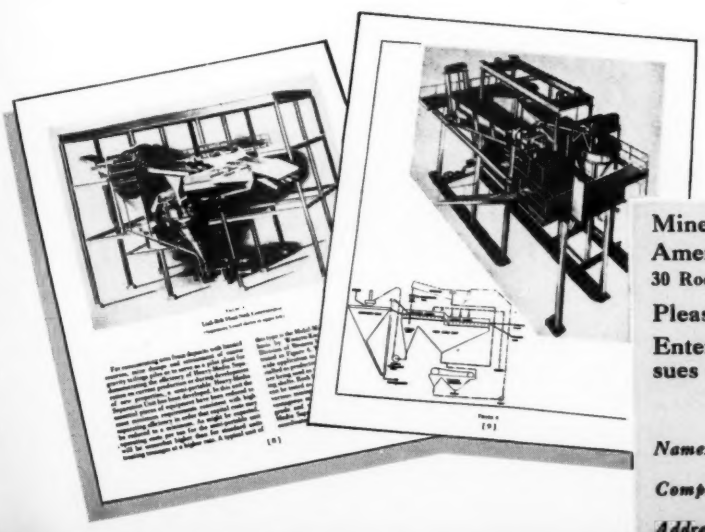
Unique processes for coal preparation by gravity difference in the size range ¼" x 0, on either anthracite or bituminous. Small size, high capacity and utter simplicity of the separating equipment and its ingenious utilization of centrifugal and centripetal forces are inherent advantages. Uses low-cost magnetic medium, with provision for continuous, automatic medium recovery and re-use. Commercial size, continuous unit for testing carload lots now in operation in the Cyanamid Mineral Dressing Laboratory at Stamford, Conn.

With a process for every size and specification, and no self-interest in equipment manufacture or plant construction, Cyanamid offers unprejudiced counsel based on tests of your coal by various preparation processes in the Cyanamid Mineral Dressing Laboratory.

We invite discussion and stand ready to run carload tests on your coal; to cooperate with engineers of your choice in the design of efficient separation units, and to provide the practical assistance of Cyanamid Field Engineers in tuning up the installation.

AMERICAN CYANAMID COMPANY

30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.



Mineral Dressing Division,
American Cyanamid Company
30 Rockefeller Plaza, New York 20, N. Y.

Please send____copies of Mineral Dressing Notes No. 16.

Enter my name to receive, without obligation, future issues of Mineral Dressing Notes on ☐ Coal Preparation ☐ Ore Dressing

*Name*_____

*Company*_____

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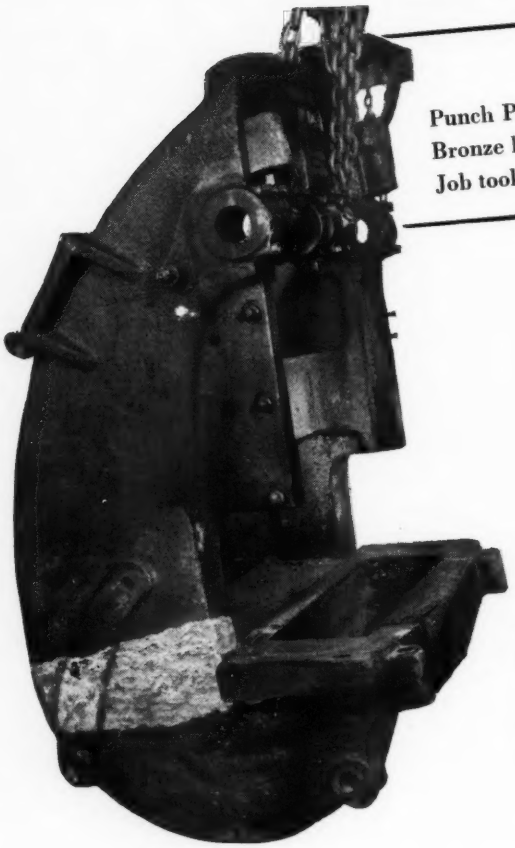

REPAIRED

Punch Press frame repair-welded with 52 lb. of 3/8" Tobin Bronze by the Sutton-Garten Company, Indianapolis, Ind. Job took one day for preparation and one day for welding.

RECONDITIONED

This group of worn and broken gears from wire braiding machines was quickly and economically reconditioned with Tobin Bronze Welding Rod.

...by TOBIN BRONZE WELDING

Almost any piece of equipment made of cast iron, malleable iron, steel or copper alloys can be quickly and economically repaired by oxy-acetylene welding with Tobin* Bronze.

Because of the low temperature used when welding with bronze, no serious stresses are set up, there is less chance of warping or cracking and parts can often be welded without dismantling equipment.

For years, this method of bronze welding has been used for reclaiming broken, fractured or worn equipment, or for building up bearing surfaces—at a fraction of the cost of replacement parts.

Write for Publication B-13, containing detailed information on Anaconda Welding Rods, including Tobin Bronze and "997" (Low Fuming). 47171A-Rev.

*Reg. U. S. Pat. Off.

ANACONDA
from mine to consumer

Anaconda

WELDING RODS

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

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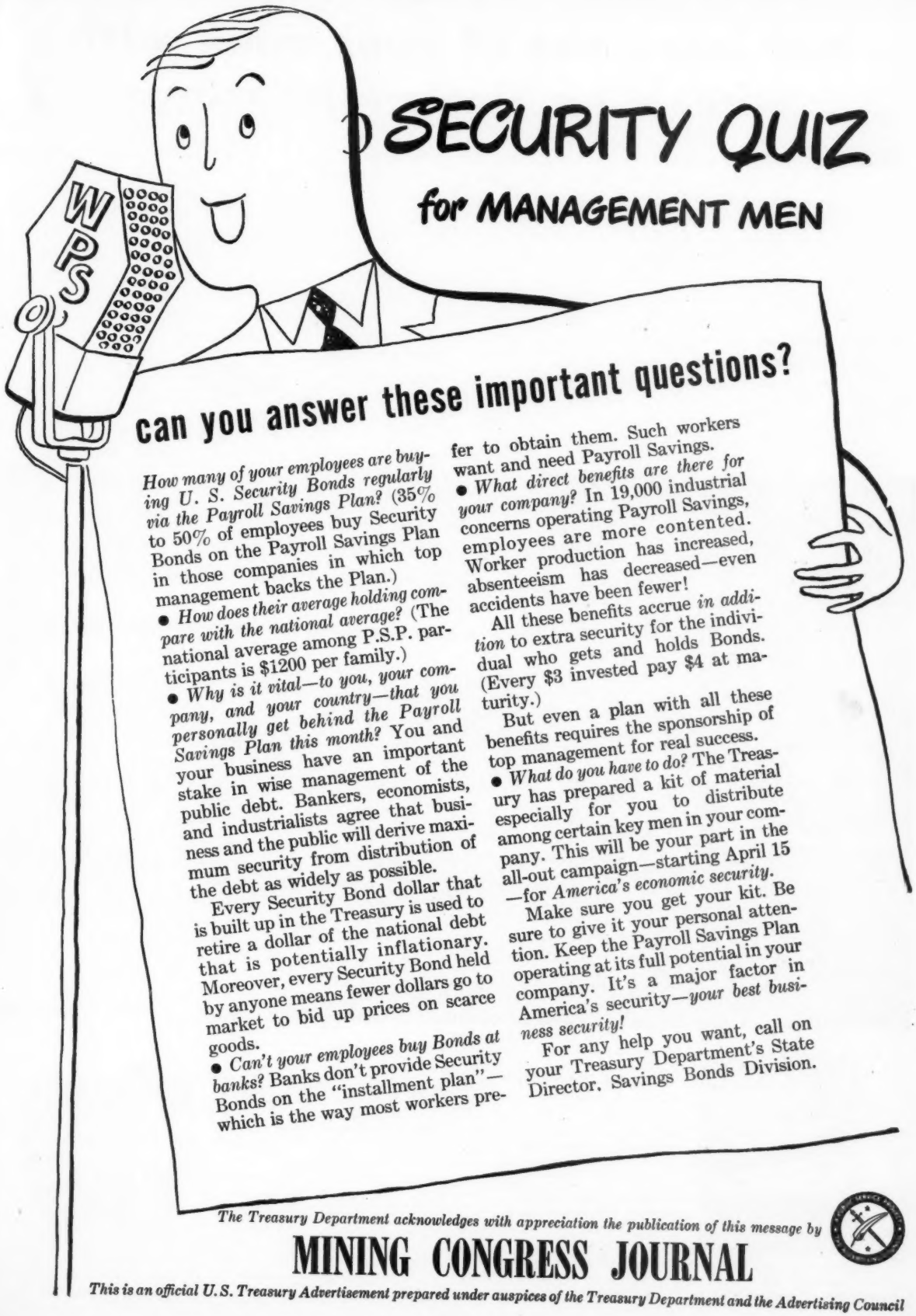


SECURITY QUIZ

for MANAGEMENT MEN

can you answer these important questions?

How many of your employees are buying U. S. Security Bonds regularly via the Payroll Savings Plan? (35% to 50% of employees buy Security Bonds on the Payroll Savings Plan in those companies in which top management backs the Plan.)

● *How does their average holding compare with the national average?* (The national average among P.S.P. participants is $1200 per family.)

● *Why is it vital—to you, your company, and your country—that you personally get behind the Payroll Savings Plan this month?* You and your business have an important stake in wise management of the public debt. Bankers, economists, and industrialists agree that business and the public will derive maximum security from distribution of the debt as widely as possible.

Every Security Bond dollar that is built up in the Treasury is used to retire a dollar of the national debt that is potentially inflationary. Moreover, every Security Bond held by anyone means fewer dollars go to market to bid up prices on scarce goods.

● *Can't your employees buy Bonds at banks?* Banks don't provide Security Bonds on the "installment plan"—which is the way most workers prefer to obtain them. Such workers want and need Payroll Savings.

● *What direct benefits are there for your company?* In 19,000 industrial concerns operating Payroll Savings, employees are more contented. Worker production has increased, absenteeism has decreased—even accidents have been fewer!

All these benefits accrue *in addition* to extra security for the individual who gets and holds Bonds. (Every $3 invested pay $4 at maturity.)

But even a plan with all these benefits requires the sponsorship of top management for real success.

● *What do you have to do?* The Treasury has prepared a kit of material especially for you to distribute among certain key men in your company. This will be your part in the all-out campaign—starting April 15—for *America's economic security.*

Make sure you get your kit. Be sure to give it your personal attention. Keep the Payroll Savings Plan operating at its full potential in your company. It's a major factor in America's security—*your best business security!*

For any help you want, call on your Treasury Department's State Director, Savings Bonds Division.

The Treasury Department acknowledges with appreciation the publication of this message by

MINING CONGRESS JOURNAL

This is an official U. S. Treasury Advertisement prepared under auspices of the Treasury Department and the Advertising Council

Get more out of your mine with wheels on Timken® bearings

Timken bearings in Joy Shuttle Car wheels keep coal moving out of the mine faster, more dependably. Not only the wheels, but the wheel drives, motors, conveyor drive and steering gear use Timken tapered roller bearings to keep all shafts, gears and wheels in perfect alignment under severe load and shock operating conditions.

There's negligible out-of-service time for lubrication maintenance; friction is reduced to a minimum.

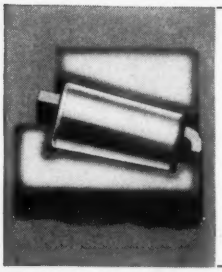
Due to the line contact between rolls and races, and positive alignment of rolls, Timken bearings have tremendous load-carrying capacity —take both radial and thrust loads in any combination. Their true rolling motion and incredibly smooth surface finish enables Timken bearings to operate freely and frictionlessly. Timken bearings permit the use of closures which effectively retain lubricants, saving both maintenance time and materials.

No other bearing can give you *all* the advantages you get with Timken tapered roller bearings. Be sure you have them in your mining equipment wherever the loads are tough. Look for the trademark "Timken" on the bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.

JOY MANUFACTURING COMPANY of Pittsburgh, Pa. . . . mounts shuttle car wheels on Timken bearings to reduce hauling costs, simplify lubrication, cut maintenance time, increase wheel and axle life.



GREATER LOAD AREA

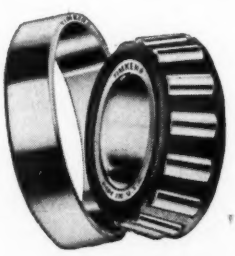
Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION ✳

Rough country made railroad construction expensive.

New Coal Field Opened in Eastern Kentucky-Virginia

Mining Operations Have Begun and Surface Plant Construction Is Well Under Way in the Southwest Virginia Coal Field Which Has Just Been Tapped by the C & O Railway

A NEW coal field with vast undeveloped reserves, estimated at more than 300,000,000 tons of high quality fuel, has just been opened by a 14-mile extension of the Chesapeake & Ohio Railway. The line follows the "Trail of the Lonesome Pine" from Southeastern Kentucky across into Wise County, Va. The new branch is a part of the Big Sandy Division of the C & O Railway. Starting at Jenkins, Ky., the headquarters of the operations of Consolidation Coal Co. (Ky.), the branch ends at the new Meade plant of the Clinchfield Coal Corp. on Meade Fork about 5 miles east of Pound, Va.

Eighteen months and something over $3,000,000 were required to build the railroad. One of the main features of the construction is a 3672-ft tunnel driven through Pine Mountain and crossing the state line from Kentucky into Virginia. Work on the western tunnel approach near Jenkins was started on June 24, 1946. Cutting of the eastern approach near Pound was begun the following month. Actual boring of the tunnel started at the Jenkins end on Dec. 4. 1946, and on the eastern end on April 25, 1947. Driving from both ends through a vertical fault the workers "holed through" in the early morning of Jan. 16, 1948. The bore was lined with 12-in. timber supports as the work progressed. The completed tunnel is 22 ft high, 18 ft wide and pierces Pine Mountain at an elevation of about 1700 ft or approximately 800 ft below the summit.

Difficulties in Tunnel Driving

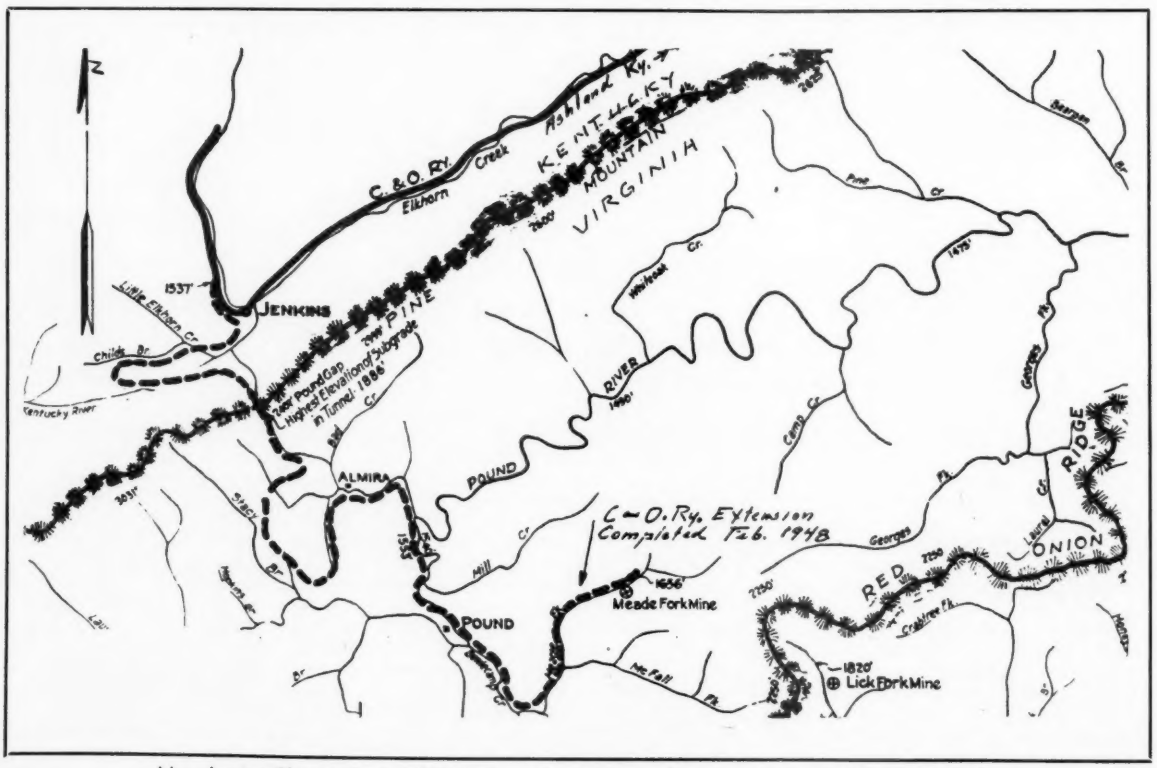
There was a rather severe condition encountered near the Jenkins end of the tunnel caused by soft rock and earth. Chief Engineer L. T. Nuckols of the C & O described the job as "the toughest tunneling proposition" he had experienced. This material began to fill the excavation soon after it was blasted. To overcome this obstacle, engineers decided to cut back the hill above the tunnel mouth and reinforce the timber lining at the west end with 8-in steel beams to offset inward pressure of the walls, downward pressure of the roof, and upward pressure from the floor. Then

Arch sets of 12-in. timber completely line the tunnel.

walls, roof, and floor of this tunnel section, about 900 ft in length, were lined with concrete. The remaining section was timbered, using a total of 2,289,000 bfm of framed sawed lumber.

More than 84,000 cu yd of rock and earth were excavated in driving the tunnel and the entire construction, including hill cuts made along the extension, involved a total removal of about 2,000,000 cu yd of earth. This yardage would fill 43,478 average size railway coal cars, and would make a train about 370 miles long. The largest single hill cut was made at Mudtown, near Jenkins, where over 300,000 cu yd of earth were moved.

Also included in the line construction was a 60-ft timber trestle and five steel bridges ranging in length from 60 ft to a two-section 200-ft span across the Pound River. Planned by C & O's engineering department at Richmond, Va., the extension project was supervised by G. R. Jenkins, district engineer for the C & O at Pikesville, Ky., and D. W. Preston, resident engineer for the C & O with temporary headquarters in Jenkins. Estimated to cost a total of $2,755,000, the complete construction cost actually exceeded this figure due to the unexpected difficulties encountered at the western end of the tunnel. The new railroad is now ready to handle regular traffic and as soon as mining operations are under way, coal will start toward the nation's industries at a rate which eventually will reach about 80 cars per day.



Map showing Chesapeake and Ohio Railway extension from Eastern Kentucky into Southwest Virginia.

New Plant of Clinchfield Coal Corporation

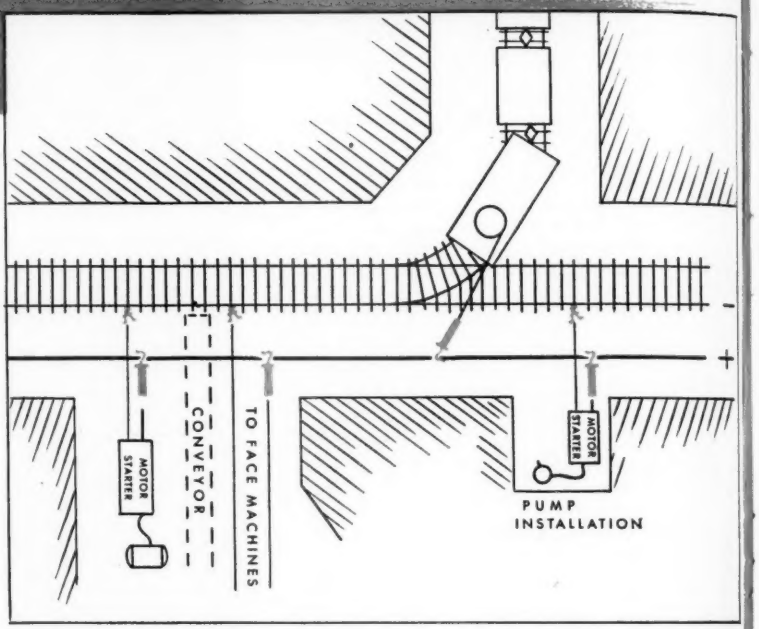
One plant, the new Meade Mine of Clinchfield Coal Corp., with an estimated reserve of 40,000,000 tons, is almost complete. This mine will operate primarily in the Clintwood Seam, a medium volatile, low ash, low sulphur, high Btu, all-purpose, industrial, and by-product fuel. The thickness of the minable coal in the Clintwood Seam varies from 4 ft to 12 ft depending upon the location. However, the greater portion of the underground workings at the Meade property will be in an area that contains approximately 6 ft of coal.

The operation is to be fully mechanized with off-track equipment, consisting of tractor loading machines, shuttle cars, and universal tire-mounted cutting machines. The main line haulage will be with track and mine cars; 20-ton locomotives and eight-ton, drop-bottom mine cars will be used for transportation from the loading points in the working panels to the preparation plant outside. The preparation plant is now nearing completion and is a modern all-steel structure. It is to be equipped with vibrator and shaker screens, loading booms, and layer loading hoists. Sizes from 10 in. to ⅛ in. are to be washed; the cleaning is to be by the Chance sand flotation process using a 15-ft diam cone. The tipple will have five loading tracks but six sizes will be prepared, with two sizes loaded on one track. An initial daily production of approximately 500 tons per day is planned with an ultimate production of 5000 tons per day. Maximum production is expected to be reached by October 1948.

Heavy ground required open cut at tunnel approach.

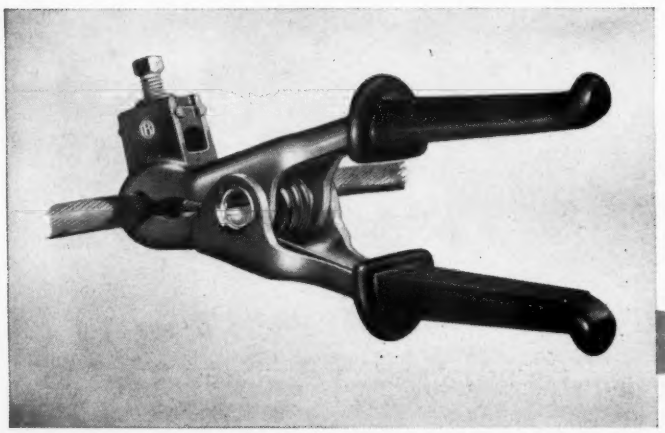
Railroad terminates at new cleaning plant of Clinchfield Coal Corporation, now under construction.

How to Stop MAKESHIFT POWER CONNECTIONS

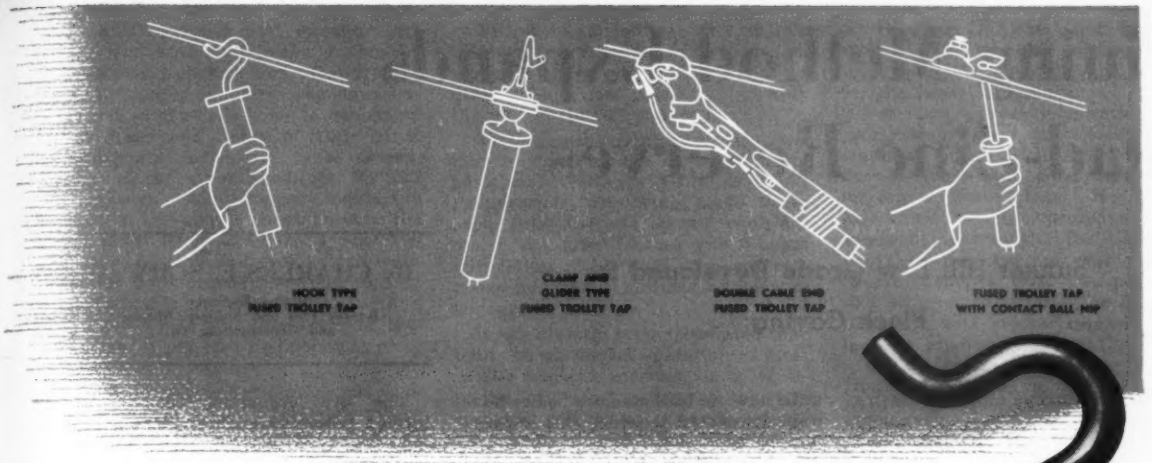


To Ground

....TIGHT GRIP OF PLIER-TYPE GROUND CLAMPS PREVENTS EXCESSIVE POWER LOSSES.... Ground connections can be a potential source of power loss—but not if you use O-B Plier-Type Ground Clamps. These sturdy devices provide a perfect mechanical and electrical connection. They may easily be attached to either bond cables, rail base or negative feeders as large as 1,000,000 circ. mils. Their strong, spring-kept jaws hold tight with a grip that is unaffected by twisting or vibration. Safe rubber handles protect the man making a connection.



Stop makeshift return circuit connections by installing Plier-Type Ground Clamps throughout your mine. They are available in two sizes to handle a wide range of cables. Order some today.



To Feeder...

FUSED TROLLEY TAPS PUT SHORT CIRCUIT PROTECTION WHERE SHORT CIRCUIT PROTECTION BELONGS....

It costs but little to equip your mine with O-B Fused Trolley Taps. But the protection these simple connective devices bring is worth many times their original cost—mechanical protection against hazardous makeshift connections to the feeder system; fused protection against overload and burnout of both cables and machines. Why take chances? Safeguard your large investment in equipment, cables and time by connecting all trailing and machine cables to the feeder through O-B Fused Trolley Taps. There is a size and type to meet every condition. Fuses from 3 to 400 amperes can be handled. Four different end arrangements are available. For more complete data and ordering information, write for booklet 790M.

Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

2791-M

Mining Method Expands Lead-Zinc Reserves*

Bunker Hill Low Grade Developed for Block Caving

By CHARLES E. SCHWAB
Mining Engineer
Bunker Hill and Sullivan Mining and Concentrating Co.

TO the nonferrous mining industry searching for real argument against planned economy, the year 1947 stands out as ample proof that mining initiative can still be counted on to serve our nation's needs for metals. In spite of some almost overwhelming difficulties, there have been major exploration, prospecting, and development programs started and announcements are being made of new discoveries. Many of these discoveries have one thing in common. They are being made in old and established mining districts. The old saying that "the best place to look for more ore and new ore bodies is near productive mines" still holds good. And it seems even more true in the Coeur d'Alene district.

The 64-year history of the district, with a production of over one billion dollar's worth of metal, places it in a unique position with seven other mining districts of the world having a similar record.

Judging from the deep exploration now in progress in the Coeur d'Alene, more high grade discoveries will be forthcoming. It is striking and important then, that in a district producing lead, silver, and zinc for over 60 years from high grade veins, the existence of a large tonnage of low grade lead-zinc ore that will be mined by block caving has been proven. The departure from usual mining methods could not be greater. Square sets and block caving stand as two opposites in underground mining; highest costs for square sets—lowest costs for block caving; square sets most selective—block caving least selective; lowest tonnage per man-shift in square sets—highest tonnage per man-shift for block caving.

Mass mining by block caving has served the copper industry for over 30 years. Such operations as Ray, Miami, Inspiration, Braden, Consolidated Coppermines, and many others speak for its importance to copper mining. And just recently a comprehensive program was announced to apply this method to Butte ores. But until now, no lead-zinc ore bodies have been discovered to which this low-cost mining method has been applied.

To describe the location of the area where block caving will start is to refer back to the original discovery of the Bunker Hill mine and the Sullivan mine. In more ways than one, operations go back to the "top" near the outcrops of the famous lodes and claims that made Bunker Hill a successful enterprise. The area of low grade ore is about a mile up Milo Creek from Wardner. About 600 ft away are the old caved portals of Sullivan 1, 2, and 3 levels, driven on the Sullivan vein—the Sullivan claims being located in 1885. Down the canyon, 800 ft toward Wardner, is the Bunker Hill claim, also located in 1885, dotted by old dumps at the portals of Bunker Hill, 1, 2, 2½, and 3 levels. Adjacent to the Bunker Hill claim are the Stemwinder, Emma, and Last Chance, names of great moment in mining history, particularly in mining litigation. Old foundations of early-day concentrating plants remain as ample evidence of the scene of feverish activity in the 1880's and 1890's. The Reed Tunnel driven in the early 1890's, for the Bunker Hill 5 level, is still used today—over 50 years later—to serve the development and exploration of the low grade ores.

Two Years' Work Proved Ore Body

Prospecting and exploration for this ore body began in March 1946 and has continued up to the present date. During that time almost 7000 ft of crosscuts and drifts have been driven to determine the grade and limits of the minable ore. All the limits of ore are assay walls, except one end, which has the Cate fault as a footwall. The Cate fault has been the major structural feature of the mine since the beginning of operations and most of the 20,000,000 tons produced since 1886 have been extracted from stopes along the Cate or in the footwall of the Cate. However, this new low grade material occurs in the hanging wall of the Cate fault, leaving a vast area and depth of unexplored virgin ground to be prospected.

The ore occurrence cannot be termed disseminated in the same sense that the word has long been applied to the copper porphyry deposits. It is evident that the quartzite in the zone was at one time subject to extreme tension causing the opening of a network of cracks and channels in which sphalerite and galena were deposited. This pattern is clearly seen in crosscuts through the ore body—barren quartzite followed by a stringer of sphalerite and galena—more barren quartzite, another stringer—and so the pattern keeps repeating. The size and regular repetition of these small veins or stringers determines the cutoff for ore minable by block caving. The small stringers from 1 ft wide down to almost hair-like fineness are in themselves high grade, like the usual veins mined in the Coeur d'Alene District, but, of course, they are too small to be mined separately.

The rough dimensions of the ore body are 1000 ft in length and 175 ft in width. Present plans are concerned only with ore above 5 level, leaving over 300 ft of height to the surface.

Bulk Sampling Determined Grade

Unquestionably, the most troublesome problem at the outset of the program a year and a half ago was to accurately determine the grade or assay of the ore during the exploration period. Diamond drilling to determine grade has never been satisfactory in the Coeur d'Alene. Grab samples and channel samples, in a zone of blocky quartzite and small high grade stringers, would not be reliable for obvious reasons. Sampling on a large scale was the only answer. The operations were planned to provide a six to eight-ton sample from every 30-ton round in the 5 level, and one car out of every four was cut out of the train. This method of sampling may have been done in other mines, but not on such a large scale nor with as many working places going at the same time. This sampling has been time consuming and expensive, but it must be remembered that

* Slightly condensed from a paper delivered before the 53rd Annual Meeting of the Northwest Mining Association.

one-half of 1 per cent more or less lead and zinc can "make or break" an ore body such as this. Our friends in the copper industry who have but to drill churn-drill holes to determine the grade and limits of their block caving ore bodies are to be envied. But, on the other hand, one distinct advantage over copper producers exist in this development because the ore lends itself to cheap pre-concentration by sink and float. This work has to date proved 5,000,000 tons of ore minable by block caving with a combined lead and zinc assay of better than 3 per cent and about ½ oz of silver.

Detailed plans for mining are completed and the next six months will be spent preparing the first block of 300,000 tons for production. A block of ground, about 200 ft square, will have many short raises driven to the undercut level. By retreating and successively blasting out all the pillars between the raises, all support will be removed from underneath the block. As the ore caves and flows from the finger raises, various-sized scrapers, up to 72 in. in width, will deliver it to ore passes by electric tuggers. Handling the chunky and blocky muck, which will be produced by block caving in a mine equipped to transport small-size, square-set ore, presented another problem. Somewhere along the line the size of this coarse ore had to be reduced. Therefore, a primary crushing plant will be installed underground with a 36 by 48-in. jaw crusher and conveyors will be used to deliver the crushed ore to loading points.

With a rebuilt mill capacity of 2800 tons per day, the mine will produce all the high grade ore possible and then draw enough low grade ore to keep the mill up to full capacity.

As the block-caving operations get into production, the development of additional reserves will continue. Preparations are being made to go back into the old caved workings under the Last Chance and Bunker Hill claims in the hope of discovering many additional millions of tons of low grade reserves.

It has already been speculated that, with the successful operation of block caving and the increase of these reserves over existing figures, the mine and mill production capacity will be materially increased over 2800 tons to provide high volume extraction with accompanying reduction in operating costs.

"Have-Not" Theory Dispelled

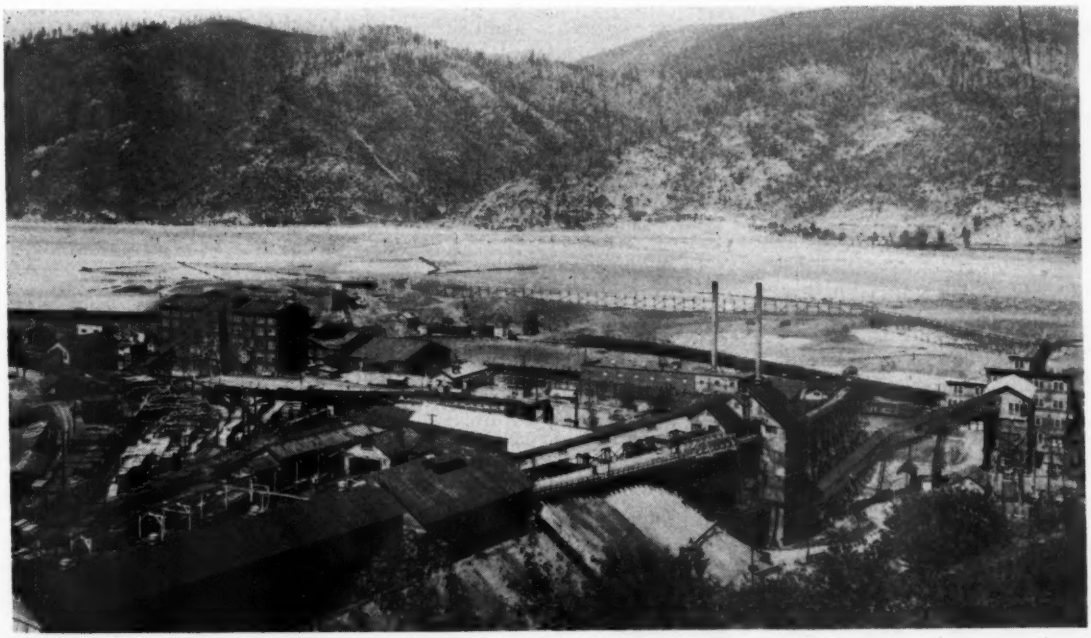
Then, certainly this low grade development has some part in the nonferrous industry's answer to the American public when we face the fact that public concern over metal reserves is logical and proper. Unfortunately the public has been stirred up by a lot of loose thinking, guesswork, and theoretical reports. The copper-lead-zinc industry must on every occasion make known its answers.

During the year 1947, the copper industry has given these "planned economists" a rude awakening by reporting over 500,000,000 tons of new ore reserves, all to be mined by block caving. The lead-zinc mining industry will in time have the same answer for the American people.

For five years, exploration and prospecting were practically at a standstill in an all-out effort for production from blocked-out reserves at an unprecedented rate. No quarrel exists with such a procedure when emergency demands it. But those who cite these depleted post-war reserves as argument for their own pet plans and schemes to shackle the lead-zinc industry with more regimentation, must be vigorously opposed.

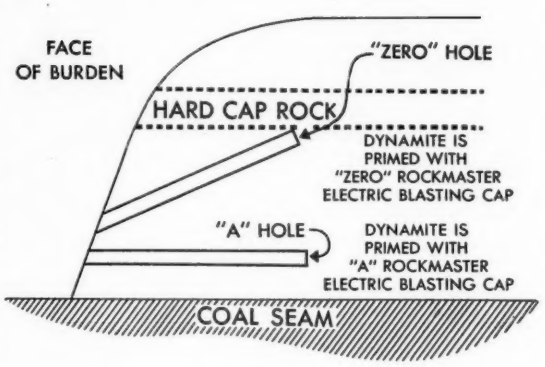
Unquestionably, the Coeur d'Alene District will play a major part in answering these critics. No one has had the temerity to forecast the date of the exhaustion of high grade lead and zinc ores in this district, but, at whatever far-distant time such may become the case, the development and mining of low grade ore will project that date many many years further into the future.

In the case of the 5,000,000 tons of low grade reserves in the Bunker Hill mine, it should be borne in mind that from the outcrop of this ore body it is 4000 ft vertically to level 23 where high grade stopes are being mined; or, to put it another way, it is 7000 to 8000 ft down the dip of the lodes and faults to present high grade mining areas. Obviously, potentialities for low grade reserves have been merely scratched. In an extensive mineralized area like the Coeur d'Alene there must be many other potential low grade ore reserves which can be mined by block caving.



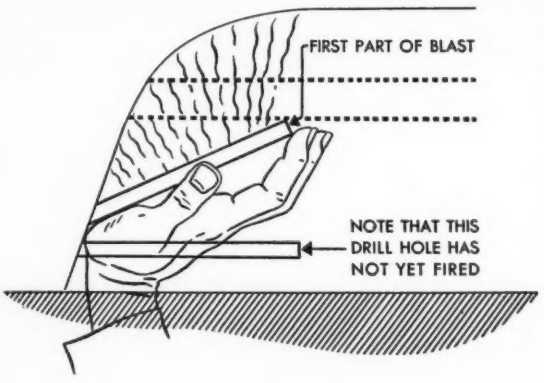
Milling capacity will be increased to handle the new production.

How **ROCKMASTER** Smashes the Burden While It Cushions the Coal


FACE OF BURDEN
"ZERO" HOLE
HARD CAP ROCK
DYNAMITE IS PRIMED WITH "ZERO" ROCKMASTER ELECTRIC BLASTING CAP
"A" HOLE
DYNAMITE IS PRIMED WITH "A" ROCKMASTER ELECTRIC BLASTING CAP
COAL SEAM

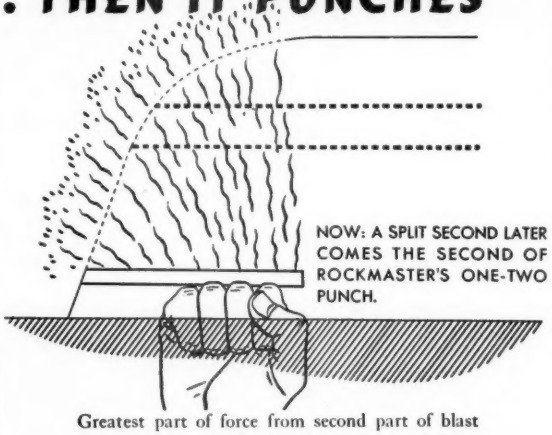
Cross section showing how drill holes are arranged for one type of Rockmaster blasting in strip pits where horizontal drill holes are used. Upward pitching holes are spaced between horizontal holes along the face.

FIRST...IT PUSHES



In first part of blast, charge in "zero" hole lifts upper part of burden.

...THEN IT PUNCHES



Greatest part of force from second part of blast acts toward newly developed "free" face, delivers another blow toward burden, thus helping save coal.

This method gives excellent throw and breakage of the over-burden and cuts down vibration under these conditions. Checking and cracking of the coal is minimized.

For consultation on problems involving the use of the Rockmaster system of blasting, write Atlas, originators of milli-second delay blasting.

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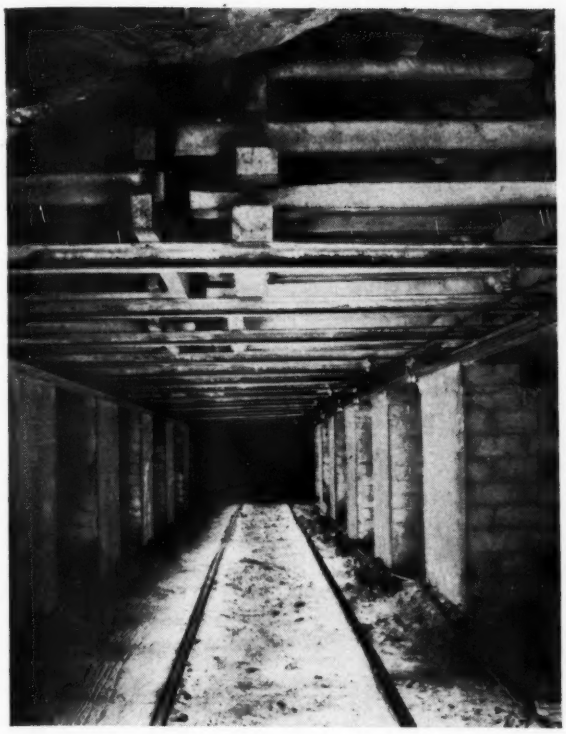


The results of treated and untreated roof supports.

Wood Preservation For Mines

Maximum Economy in Timber Use Depends Upon Service Life Required

By S. S. WATKINS
Timber Products Consultant

PRESERVATIVE treatment of wood, either against common decay or against the scores of other wood-destroying organisms, becomes increasingly important with the growing scarcity and mounting cost of naturally durable wood, and with the attendant necessity of utilizing wood less durable — unless preservatively treated—but more available and at lower cost. Add to this the ever-increasing expense of installation.

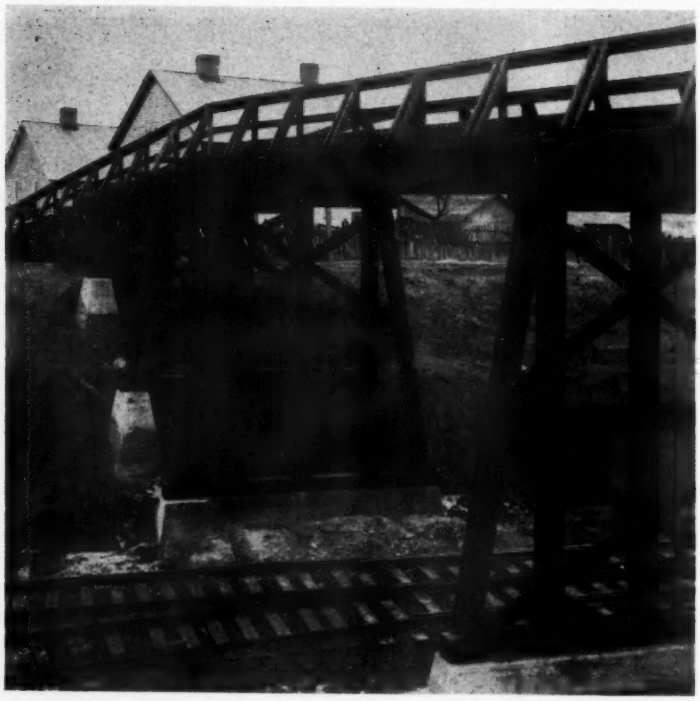
Whether or not preservative treatment is economically justified must be determined on a comparison of the final cost-in-place. It is reasonable to say that, whenever the service life required of timber is greater than may be expected from readily available untreated wood, then some type of preservative treatment is indicated. Certainly timber used extensively in and around mines, and exposed to dampness and fire hazard, merits serious study to bring about the desired combination of maximum efficiency with lowest average yearly cost.

Such a study should determine, not only wood resistance to decay or attack by other destroying organisms and their indicated treatment, but mechanical wear and tear such as spike killing or rail cutting in the case of standard or narrow-gauge ties. One large railroad recently reported that out of 81,508 treated ties removed from test tracks over a period of years, 58.5 per cent had failed from "mechanical destruction." Obviously, it would be economically unsound to preserve timber against decay for a service life substantially greater than the mechanical life of the timber involved.

On the other hand, "mechanical destruction" need not play a large part in the subject under immediate consideration. In the extensive range of uses for timbers in and around mines, the life of the mine—or resistance to decay alone—may be the deciding factors in determining the kind and extent of treatment best suited to the need.

When necessity for preservation is evident, two general kinds of treatment are available—one of the non-pressure methods or one of the recognized pressure processes. If an added life of only a year or two is required, the first method may provide the necessary protection, but if greater permanency is indicated the latter should definitely be specified.

It is well known that the flow of air progressing through a mine picks up the fungus infection that causes decay, so that timber at or near the outlet usually becomes more vulnerable than elsewhere. Moreover, de-



Timber for surface structures should be treated before framing.

cayed or decaying wood loses strength rapidly and is much more inflammable than sound wood. This squarely poses the problem of the fire hazard in mines.

Preservation Decreases Fire Hazard

Although the value of wood preservation to prevent decay and invasion by other wood-destroying organisms has long been recognized, it is not so generally known that timber may also, and at the same time, be treated to present high resistance to fire. Such treatment has great value where a fire hazard exists. Timber treated for fire resistance or fire retardance has many qualities not possessed by other structural materials, and, when subjected to fire or flame, may receive a charred surface but will retain the essential qualities for continued service. Under similar conditions, many other structural materials would bend, twist, or crumble. Hence, preserved wood used in the construction or operation of mines, whether specifically treated for fire retardance or for resistance to decay only, still reduces the fire hazard by maintaining soundness.

Creosote, or a solution of creosote and coal tar or petroleum, is the most commonly used preservative, especially when a colorless, odorless, and paintable product is not required (as in mines) and when the treated timber is to be used in contact with water. If a high degree of fire resistance is desirable in which an oil treatment is wholly or partly ruled out, one of the recognized salt preservatives has frequently proved of great value. Between these two general types, many combinations of each or both have demonstrated their worth.

All timber should be conditioned before treatment by the removal of sufficient water to enable impregnation of the timber with the required amount of preservative to penetrations consistent with the retentions specified. Air seasoning is the most common method of conditioning. When time does not permit of proper air seasoning, then artificial conditioning should be used. Heating in oil under a vacuum (the Boulton process) is most commonly employed to pre-condition Douglas fir and most hardwoods, but such woods as southern pine which do not tend to check, warp, or split under higher temperatures are subjected to steam conditioning. The latter method is used on fir and hardwoods only when a salt treatment is involved.

Treated wood should not be cut. Therefore, timber that must be bored or cut before use should have this service performed prior to treatment. Most wood preserving plants are equipped to do this work, and at costs generally below those which would prevail in on-the-job framing.

Other methods of conditioning timber have been and are now being developed, with even greater promise of simplifying and expediting the proc-

Preserved ties will last the life of the haulageway.

Steel rail, stringers, and crossbars where soft floor prohibits posts.

ess and with greater cost savings. Notable among these is the recently developed vapor-drying method.

The railroads and utility companies of the United States have long recognized the value of wood preservation and today nearly all cross and switch ties, power, light and communication poles, as well as many other items are preservatively treated.

Treatment Permits Use of Variety of Wood

Not many years ago the annual consumption of cross ties in the United States alone amounted to from 130 to 150 million pieces, while today, because of wood preservation, the annual requirement is approximately 40 million pieces, or a saving of 90 million or more per year. Using an average figure of 35 bfm per tie, this then means the conservation of 2,750,000,000 bfm per yr. At the same time, treatment has made usable as ties a wide range of wood specie such as gum, beech, sap pine, etc., which because of low natural resistance to decay could not be used untreated. Moreover, the average life of ties in track has been multiplied by three to four times, thus saving labor in making replacements.

Properly treated ties should last from 15 to 30 yr, depending upon the character of the service to which they are subjected, while other treated timber, not subject to severe mechanical wear, may be so preserved as to have a practically indefinite life.

There is such a wide range of mine uses for wood products, both inside and outside of the mine, such as ties, props, bars, wedges, caps, stairways, shafts, etc., inside; and poles, tipples, trestles, retaining walls, dwellings, etc., outside, that it would be difficult to make any general rule as to where and when preservatively treated timbers should be used. However, if the service life required is greater than that provided by available untreated wood, then wood preservation should effect economies.

Realistic Consideration Can Effect Economy

The following comparative figures may be of interest to indicate the savings that may be accomplished. The cost figures used are those prevalent at this time in one representative mining locality. The cost of installation is an assumed average figure and would vary a great deal depending on the job involved.

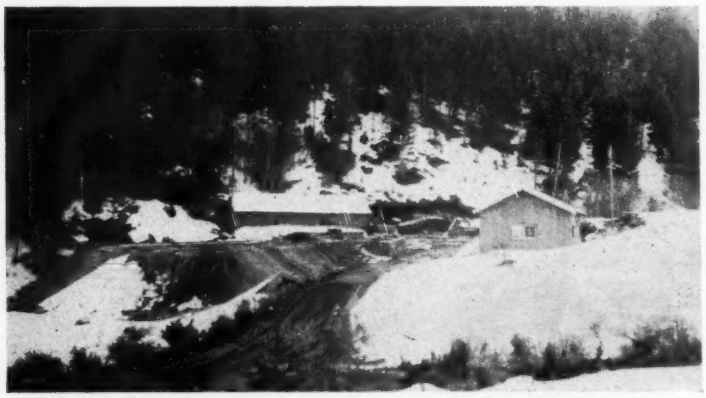
Cost of untreated timber at mine	$50.00 per M.
Installation cost	20.00 per M.
Cost in place	70.00 per M.

Assuming a service life of six years and 6 per cent interest on the investment, then the maintenace cost per 1000 bfm per year would be $14.21.

Cost of treated timber at mine	$95.00 per M.
Installation cost	20.00 per M.
Cost in place	115.00 per M.

Assuming a service life of 18 yr and interest of 6 per cent, then the maintenance cost per 1000 bfm per yr would be $10.58. Over an 18-yr period this would mean a saving of $65.34 per thousand board ft. The treated timber must last only 11 yr to make its use economical as compared with untreated wood having a 6 yr service life.

In this postwar period of re-adjustment, production economies of all kinds assume a high degree of importance. The proper use of preservatively-treated timber plays an important part in effecting such economies.



These buildings house the service facilities of the Easton-Pacific tunnel.

★

By WALTER H. MYERS

President and General Manager
U. S. Grant Mining Company

★

Reopening Three "Shipping-Grade" Mines

Modern Equipment and Methods Rejuvenate Old Camp

On the outskirts of Virginia City are the claims of the U. S. Grant mine.

AFTER a 35-year period of non-production, the U. S. Grant, Alameda-Bamboo Chief, and Easton-Pacific mines situated in the Fairweather mining district, Madison County, Mont., are again active. These mines are near the famous Alder Gulch placer which has produced almost $200,000,000 in gold, principally at a price of $20.67 per oz.

Following several months of mapping, sampling, and examination, the U. S. Grant mine was reopened in July 1944. This mine had produced some 20,000 tons of ore but had been idle since about 1912 and its stamp mill was dismantled a year later. From 1913 to 1942 about 2000 tons of ore had been taken out of the mine by "high-graders" who left the mine with no ore in sight; afterwards these tunnels caved because of the mining of the pillar blocks of ore by these "high-graders." In later years the mine was generally considered to be a "dead dog." However, examination, carried on by crawling through the old workings, led to the belief that further development would discover new ore bodies. A small crew of men was put to work in July 1944 constructing a 600-ft power line, a compressor house and other buildings, and an ore bin. The caved sections of the tunnels were opened and by September several shipments of "clean-up" ore and ore from old gobs had been made.

Early in 1945 new ore bodies had been opened up and regular shipments of ore to the smelter were being made from Alder, 10 miles away. Returns from the ore was used for the purchase of new equipment in pneumatic drills, double-drum hoists, scrapers, mechanical loaders, and other modern equipment. These speeded the development of the mine and soon production was increased. Three battery trammers are now in operation and diamond drilling has disclosed additional ore reserves.

High Costs Dictate Use of Mechanical Equipment

In gold and silver values the ore averages about $15 per ton. A silica content of about 80 per cent results in a smelter treating charge of about $2.75 per ton. Adding to that $1.65 per ton for freight and $1 per ton for hauling to the railroad, results in a cost of $5.40 per ton before adding the cost of mining the ore. The increased cost of labor and materials together with higher taxes and insurance has almost doubled the cost of mining. In narrow and flat dipping veins it would be almost impossible to operate if all shoveling and tramming were done by hand. Larger companies have long ago gone to the use of me-

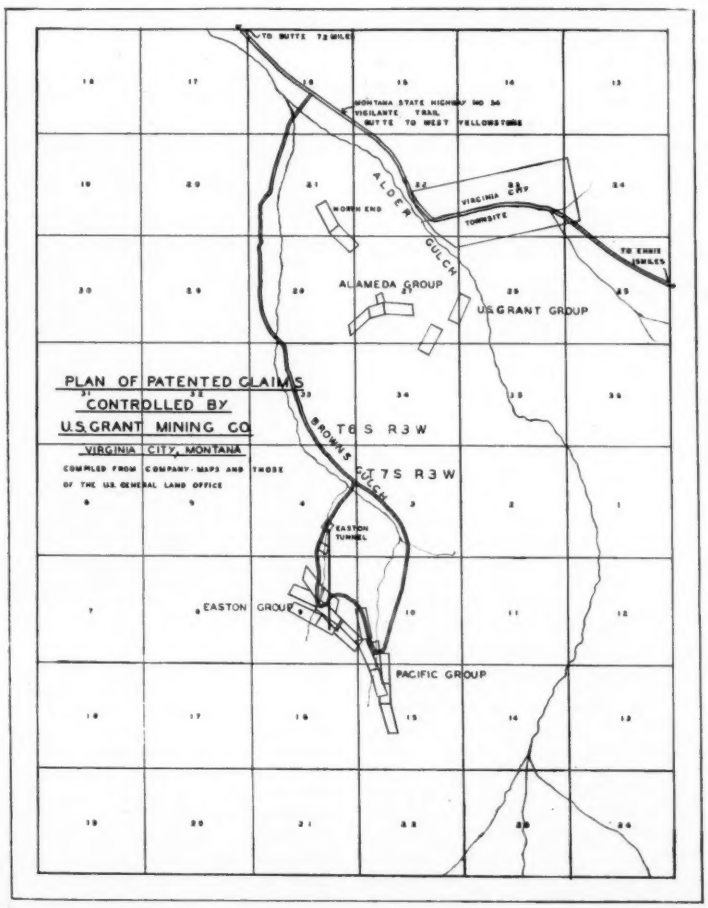
chanical equipment, but many small operations have been forced to close down because of the higher costs and the lack of such equipment.

For example, prior to the installation of battery-electric trammers in the U. S. Grant mine, all tramming had to be done by hand. Steep grades in some of the old tunnels and a haul of some 1200 to 1500 ft to the ore bin made it almost impossible for a man to make more than 15 to 17 trips per day. Figuring a production per trammer of between eight and ten tons of ore per day gave a cost in labor alone of more than $1.20 per ton. Today, with small Mancha trammers, one man loads, trams, and dumps an average of 50 tons per day at a cost of 22¢ per ton. Similar cost comparisons could be made between hand and mechanical methods of mucking and slushing of ore off the foot wall of flat veins in stulled stopes.

With the aid of mechanical equipment, during 1946 and 1947 production totalled 27,000 tons with a net profit of $97,000 for the two-year period. Since July 1, 1944, ore shipments valued at more than $500,000 have been made to the Anaconda Smelter.

Jib permits simultaneous drilling of high and low holes.

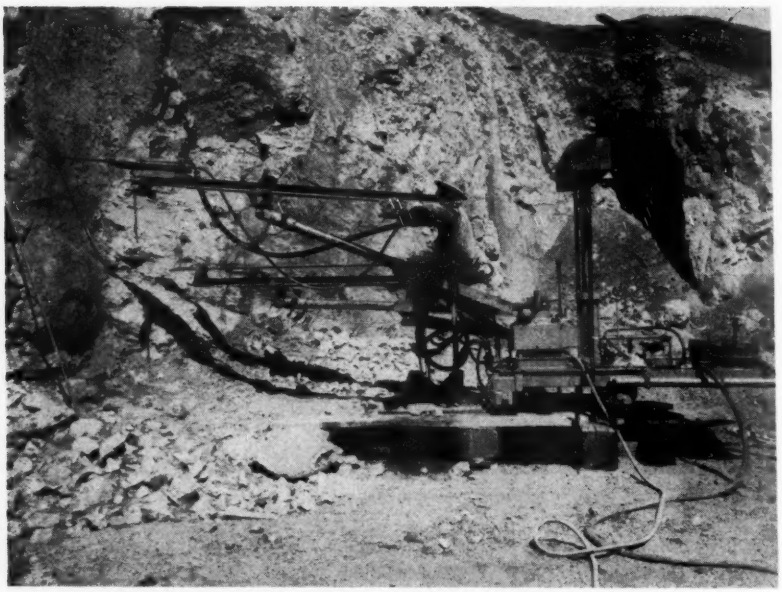
The Alameda-Bamboo Chief mine, another old timer consisting of two claims, has an inclined shaft down to the 370-ft level. This shaft had not been dewatered since the early nineties. At the collar of the shaft on the Alameda claim there is an 850-ft tunnel of which the last 75 ft runs into the Bamboo-Chief claim. On the Bamboo-Chief claim, two shallow shafts have been put down on unusually high grade but narrow veins of ore. On the surface high grade float has been found, and considerable production resulted from plowing the surface and picking up high grade pieces. Specimens assaying as much as $7000 per ton are now on display at the local museum.



To open this mine it was necessary to construct a 3600-ft power line, new buildings, and an ore bin. The original track in the tunnel had to be replaced with heavier and better track. The old shaft had to be retimbered down to the water level, a distance of 50 ft. Below that point the water had preserved the timber, but in a few places the lagging had to be replaced. New 25-lb rail was installed in the incined shaft to carry the one-ton skip. An automatic skip dump was installed on the ore bin. A 40-hp pump was used for dewatering the shaft to the 220-ft level. Most of the water was accumulated surface water. Between the 90 and the 220-ft level about 2000 tons of shipping ore and a considerable tonnage of milling ore was found to be readily available for mining.

Clean Mining Required

In most districts, where prospectors have worked, or small leasing operations have been carried on for years, the general opinion has been that shipping ore must be mined slowly to eliminate waste in the ore. Hence a great deal of time was spent in sorting. When production at this property reached 120 tons per day, information was received that too much waste material was being shipped and that the company would go broke mining and shipping the diluted gold ore. The place to sort the ore is in the stope, with the machine, at the time of drilling. Holes must be kept on ore and away from the walls. Close



Experimental jib—rail clamps hold present models in place.

sorting was tried but the time lost and the decrease in production, plus the fact that all sorted waste carried some values, soon discouraged this practice. Assays of the waste sorted carried values of from $1 to $5.50 per ton. By using the comparatively light IR 48 stopers and paying careful attention to the placement of all blast holes, the grade of shipping ore has been materially improved.

With a production of over $2,000,000 in gold and silver the Easton Pacific mine rates as the largest producer in this district. The mine was closed down in 1914 after a successful operation for the greater part of 19 years. Closure came because of a lawsuit involving the ownership rather than because of exhaustion of ore. The case was in the courts for several years and before it was finally settled, the machinery was moved and the shaft allowed to fill with water. During the court action the operator of the mine and the elder son of its owner died. The heirs then elected to liquidate all of their properties and the mine was offered for sale.

Eighteen claims combined in this group cover a distance along the several veins of nearly two miles. The mine was worked through three tunnels above the elevation of the collar of a 300-ft shaft and through this shaft. From the 300-ft level a winze in excellent ore was sunk to the 500-ft level. Before the mine closed down, the 500-ft level had been opened for a distance of 200 ft each way on the main vein and the ore averaged $30 per ton. With the exception of the work done on the 500-ft level, little work has been done on the other veins below the 300-ft level. On the Pacific claim, some 6000 ft to the southeast, good ore was being mined at the time the operation closed down in 1914.

At that time year-round operation was expensive as the Easton-Pacific is located high up on a mountain and is accessible only by steep roads which the heavy winter snows make almost impassable. At the time of the old operation teams were used to haul all equipment, supplies, and the ore. Today it would be almost impossible to truck the loads over the road during the winter and spring seasons.

Tunnel Will Cut Three Veins

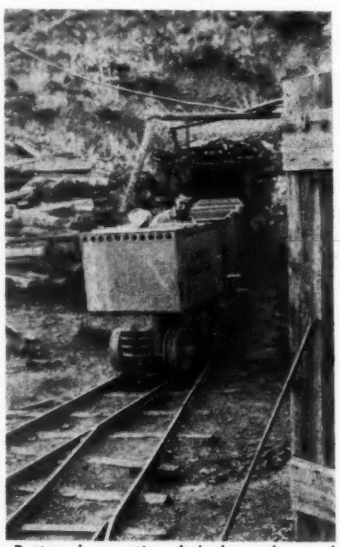
A lease and option was obtained on this property and the staff elected to drive a 4200-ft tunnel which would cut the four known veins and at the same time prospect for parallel veins which may be in the hanging wall. This tunnel will provide a back of 625 ft at the shaft and about 900 ft at the Pacific claim. The cost of running the tunnel will be more than the cost of repairing and reopening the old shaft and the purchasing of hoisting equipment, but ore coming out will be at a location where roads can easily be kept open. The mining costs will be much lower and there will be a natural drain for water, all of which will be important assets to the mining operation.

About the middle of October 1946 work was begun on the construction of buildings and a tunnel site. A bulldozer soon levelled off the necessary building space and changed the course of a small mountain stream. Again modern machinery was to play an important part on this job and orders were placed for 12- 4½-ton, Granby-type mine cars, a model 21 Eimco-Finlay loader, a Mancha electric trammer, a Joy Manufacturing Co. new Hydro Drill Jib with two T350 drifters mounted on the jib, and an IR 900 cfm, type XRE compressor.

Construction of buildings was started so as to be ready for the equipment upon delivery and also to provide housing facilities for the working crew. Actual work on the tunnel was started on Feb. 17, 1947, and by Oct. 1, 1947, the tunnel had been advanced 2100 ft. At 2633 ft. on the 26th of February 1948 the first or north vein was cut. This vein is 3 ft in width and assayed $17 per ton. The portal of the tunnel is timbered for a distance of 75 ft with five-piece segment sets made from 12 by 12-in. timbers. The cross section of the tunnel, where not timbered, is 9 by 7 ft, arched. A 4-in. air line and a 2-in. water line is carried on one side, and a drainage ditch on the other. In the back is carried 16-in. vent tubing and wires for electric blasting.

Long Steel Gives Good Daily Advance

Due to the delay in delivery of equipment, 300 ft of the tunnel was driven with the use of small cars which had to be hand trammed and dumped. At about 450 ft, heavy ground was encountered and for about 1000 ft timbering was required. For half of that distance the ground was so broken and wet, and so full of talc seams, that considerable sloughing took place after each blast. For this reason only the lower half of the face was blasted and the remainder was allowed to slough to full dimensions of the drift. When insufficient room for timber resulted from this method, plug holes were drilled and blasted, frequently over



Battery locomotives help keep the muck moving.

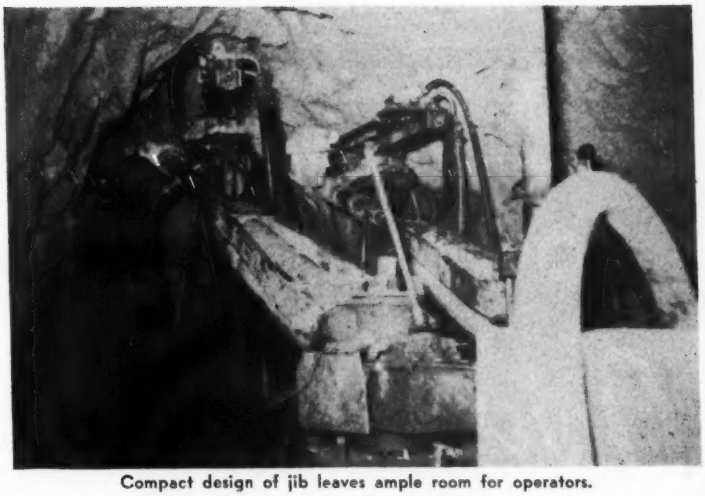
breaking and requiring considerable cribbing over the drift timber. This not only slowed up the advance, but made it necessary to handle extra tons of rock and made the work more dangerous. Of course costs got way out of line.

After passing this heavy ground and getting into ground that stood without timbering, a three-finger, burn-cut round with 21 to 25 holes was used and good advance was made. But before long a hard and tight gneiss and aplite was encountered and the number of holes had to be increased to 30 or 33.

With the new jib the machines have a 9-ft travel and a 9-ft steel is used to start the hole and drill a 7½ to 8-ft hole without changing steel or bits. A round drilled with only this length of steel will break 7½ ft. Experiments revealed that a 10-ft round could be broken by following with a 12-ft steel. This long round was used for several hundred feet and our record advance for seven days and 14 blasts was 150 ft. A 14-ft steel was occasionally used and pulled 12-ft rounds. This proved to be little too much to do in an eight-hour shift as each crew was required to lay a set of rails and install pipe. By the time this work was done and about 21 cars holding 4½ tons were mucked, there was not enough drilling time left for a 12-ft round. Hence the 10-ft round was adopted as a standard and an advance of 20 ft per day was planned. But in harder ground the round had to be cut down to 8 ft with an advance of from 15 to 18 ft per day.

Close record keeping showed that the long travel of the Hydro-Drill Jib, allowing long steel to be used, has lowered the bit cost considerably. The ground is highly abrasive and causes rapid gauge loss. If short steel were used, with a number of steel changes, a far greater number of bits would have to be stocked and used. Using the long steel a 10 to 12-ft hole can be drilled with two bits. This allows a small bit, usually a 1¾ in. or 1⅝ in., to be used as a starter and keeps the holes small; as these bits are resharpened they are reduced to even less than 1½ in. In addition, many pounds of powder are saved on each round by this method.

The value received from any mechanical equipment is through the service given the machine. The Eimco-21 mechanical loader will efficiently handle all the rock if it can be serviced with sufficient cars to remove the muck. For this reason 12-4½-ton, Granby-type, self-dumping mine cars trammed with a 3½-ton Mancha Mule battery motor are in use. Track of 40-lb weight is used with six ties to every 15-ft length. While ties and track are being placed, the loaded cars can be dumped and little mucking time is lost. The round can be mucked in about 35 min actual mucking time, but the rails and ties, plus the time at the start of the shift used in barring down, sprinkling the muck pile, and hanging vent tubes increases the mucking cycle to about three hours. The Hydro Drill Jib is set up at the face in about 20 min and by noon two to three holes have been drilled. After noon the miners have four hours to drill and load the round and connect wires for electric blasting. This cycle works well and has resulted in from 15 to 20 ft of advance per day. Two eight-hour shifts with two miners and a motorman on each shift comprise the working crews. Two men are kept busy on the day shift keeping the dump in shape and looking after equipment.



Compact design of jib leaves ample room for operators.

The track to the dump runs along a hill side on solid ground for some 300 yd. When the train of cars with rock comes out of the tunnel the motor is in front and takes the cars out past a switch and then pushes the load onto another track running diagonally across the gulch and at the edge of the dump. Dump blocks used to dump cars are made in a triangular shape with the apex of the angle up and are grooved on the side to catch the frame of the car. As the frame enters this groove, a trunnion wheel on the car rides up and over the apex of the dump causing the car to dump and right itself as it comes down the other side. In this manner a whole train of cars can be dumped without delay and, on the way back over the dump blocks, the cars dump again releasing any rock which may have been stuck in the car. As the dump fills up, the blocks are moved to another position and when the 300-ft length of the dump is filled the track is moved out to the edge and the cycle commenced again. Two interchangeable sets of Edison batteries keep the motor in continuous service.

A new steam heating system is now being installed to keep the buildings at a temperature which keeps the batteries for the motors in perfect condition for charging as well as to furnish heat and hot water in the change house for the men.

The tunnel has passed the 3900 ft mark and by March 21st will be 4000 ft. At this point the Main and Center veins will intersect at the tunnel elevation, forming one vein. This single vein should be cut on or about that date.

About 300 ft further south lies the South Vein. The fact that ore of shipping grade was found on the North Vein proves that the ore does go to and beyond this depth, and the veins ahead will make the property a larger producer. The distance from the tunnel to the southeast end line is 6900 ft and to the northwest end line, 2200 ft. Surface workings all along the vein has also proven that the ore continues to the end line in both directions, and would indicate a continuous operation for years to come.

Plans for a large mill are in the making and cannot be completed until tests have been run on the ore to determine the type mill necessary to give the best results. Present plans are to ship ore to the smelter at Anaconda, Mont. A 400-ton ore bin has been completed and shipments of ore will start in the near future. The ore from all three properties is a highly siliceous, gold-silver ore, containing oxides and sulphides. At the Easton-Pacific small amounts of copper and lead are also present.

Install it in 2 minutes . . . without tools

BOWDIL *Quick Action* ROPE SOCKET

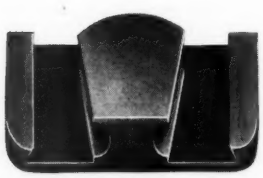
THE BOWDIL Rope Socket was designed to make quick rope replacement without tools. It can be installed anywhere in two minutes. To install it, it is merely necessary to position the rope, place the cap in position and go to work. The tension on the rope tightens the wedge-shaped cap and the greater the tension the tighter it holds. To replace broken cable, it is only necessary to drive the cap back, releasing the grip on the rope. The heavy dove-tailed cap is easily removed with a few sharp blows of the hammer and has ample body for striking.

The Bowdil Rope Socket reduces the danger of mashed, scratched or punctured fingers, common causes of delays and infections. Special hook clamp on the eye end permits instant connection to any point on a long guide line without injury to the rope.

The offset eye design gives greater protection to the rope as the pull is straight out from the socket.

The Bowdil Rope Socket is forged from high-tensile alloy steel, heat treated for maximum strength, thus permitting the use of lighter, less-bulky parts.

Bowdil Rope Sockets are made to accommodate rope of various sizes from ½" to 1". Inquiries for special application are welcomed.



Part No.	
704	. . . . ½" Rope Socket
706	. . . . ⅝" Rope Socket
707	. . . . ¾" Rope Socket
708	. . . . 1" Rope Socket

BOWDIL CANTON, OHIO

WHEELS OF GOVERNMENT

As Viewed by A. W. DICKINSON of the American Mining Congress

THE time remaining for legislative handling of any other than the must bills is short, if the Senate and House leaders are successful in attaining their present objective of adjournment by June 19. The departmental supply bills are being handled expeditiously, the European Recovery Program (Marshall Plan) is definitely on its way to enactment and while the complex international situation poses problems, the desire is strong on the part of congressional leaders to drive on for a wind-up of legislative activity at the earliest possible date. It is campaign year and the first national political convention convenes in Philadelphia on June 21. Following the adjournment it is unlikely that Congress will convene until after the November election and possibly not until January 1949.

Tax Relief

On April 2 the House and Senate overrode the White House veto on the Knutson individual income tax relief bill by votes of 311 to 88 and 77 to 10, respectively. Although Senate Minority Leader Barkley (Dem., Ky.) cfered determined resistance to the overriding of the veto, the final action of both Houses in thus enacting the bill into law is a definite indication of the temper of the country towards tax reduction.

As sent to the White House the bill carries an estimated $4.8 billion reduction in individual income taxes effective January 1, 1948. Withholding at the new rates will begin May 1, 1948. The personal exemption for each taxpayer and dependent is increased from $500 to $600; the community property principle is extended to all states; the standard deduction for contributions, medical and certain other expenses is increased from a maximum of $500 to a maximum of $1000; persons 65 years of age and above are granted an additional exemption of $600, and certain 1942 amendments to estate and gift tax provisions which adversely affected taxpayers in community property states are repealed.

The percentage cuts in taxes payable amount to 12.6 per cent of the first $400 of tax; 7.4 per cent of the next $99,600 of tax, and 5 per cent on any tax over $100,000.

The House Ways and Means Committee has not as yet reported the further tax revision bill to remove inequities in the present revenue law. The Tax Committee of the American Mining Congress is engaged in conferences with the staff of the Joint Committee on Internal Revenue Taxation, which functions in advisory capacity to the Ways and Means and Finance Committees, and is presenting the position of the mining industry on amendments needed to remove obstacles in the way of mineral resource development.

Independent Contractors

On April 1 and 2 the Senate Finance Committee held hearings on Representative Gearhart's (Rep., Calif.), bill. H. J. Res. 296, which has the effect of continuing mine "leasers" as independent contractors for whom the operater of a mine need not pay Social Security taxes, until the Congress has made a thorough study of the entire Social Security structure. Witnesses for the lumber, oil, newspapers, paper pulp and mining industries testified in support of the Gearhart bill. Carroll Searls of Empire Star Gold Mining Co. presented testimony for the American Mining Congress, explaining to the committee the operations by "leasers" so widely prevalent in the West.

Although the bill may encounter a veto, there is a good chance of its enactment, as it passed the House by a vote of 314 to 36.

Wage-Hour Amendments

Charles Kuzell, assistant general manager, Phelps Dodge Corporation, Douglas, Ariz., will appear for the American Mining Congress before Chairman Ball's (Rep., Minn.) Senate Labor Subcommittee April 22 at hearings announced to begin April 19 on the chairman's bill, S. 2386, to amend the Wage-Hour Act. The Senate Labor Subcommittee has been working in executive session for three weeks on these amendments. In addition to the chairman the committee consists of Senators Donnell (Rep., Mo.), Jenner (Rep., Ind.), Murray (Dem., Mont.) and Ellender (Dem., La.).

Under S. 2386, and effective 120 days after enactment, the minimum wage would be increased from 40 cents to 60 cents an hour. The rate could be set within the range of 50 cents to 70 cents by industry committees, with consideration given to "preservation of employment opportunities," wages paid for like work, competitive conditions, and "regional economic factors."

The bill attempts to define the term "regular rate of pay" to prevent pyramiding and eliminate some of the difficulties that have arisen under interpretations by the Administrator. The "regular rate of pay" would be computed by dividing the employe's "normal, straight time compensation" for the work week by the total number of hours worked; the "normal, straight time compensation" would, except where modified by collective bargaining, include basic wage payments, whether at hourly rate, day rate, piece rate, or salary, together with production bonuses and other incentive payments determined by reference to production or efficiency; at-

Washington Highlights

CONGRESS: Functioning efficiently.

TAX CUT: Veto Overridden.

"LEASERS": Exempt from payroll tax?

WAGE-HOUR: Amendments introduced.

TRADE AGREEMENTS: May get short extension.

RUSSELL BILL: Amendments proposed.

SUBMERGED LANDS: Mining claims protected.

COAL: White House to act on strike.

tendance bonuses; shift differentials; premiums for hazardous, arduous or dirty work; and other bonuses paid quarterly or more often, pursuant to contract or established practice of the employer. However, the "normal, straight time compensation" would not include overtime premiums for work scheduled in good faith in excess or outside of the normal work day or work week, including premium payments for work performed on Saturdays, Sundays and holidays; and such overtime payments would be credited against the overtime compensation required by the Act. Certain other items would also be excluded, though they would not be credited against the statutory overtime pay except by collective bargaining agreement. These include premium payments for work performed during vacations; pay for vacations, holidays and other time not worked; employer contributions and benefits paid under pensions, medical or hospitalization or death benefit plans, or approved profit-sharing plans; and bonuses paid less often than quarterly and not measured exclusively by production or efficiency.

The exemptions for executive, administrative and professional employes remain subject to regulations of the Administrator, but there is a further exemption under which any employes on a salary basis amounting to $100 per week or more, would not be subject to the maximum hours provisions. The Administrator is given power to issue interpretative regulations—in which he shall avoid competitive inequalities and take into account customs, practices and collective bargaining arrangements prevailing in the industries affected.

Portal-to-Portal Act provisions relating to administrative rulings, liquidated damages, etc., are included, and any act of an employer done or omitted in conformity with any outstanding regulation or order of the Administrator would be protected against penalties under the Act.

It may be that in the drive for adjournment any wage-hour amendments acted upon by the Labor Committee will not be enacted, but it is extremely important that industry witnesses make a record before the committee at this time as quick action is anticipated in the next session of the Congress.

Foreign Trade Agreements

No hearings have been set by the House Committee on Ways and Means on the bill introduced by the committee's former Chairman Robert Doughton (Dem., N. C.), to extend the Foreign Trade Agreements Act for three years beyond June 12. It is deemed likely that the committee will consider the subject in executive session and perhaps extend the authority until early in 1949.

Meanwhile, Representative D. A. Reed (Rep., N. Y.,), ranking majority member of the Ways and Means Committee, sharply criticized recent hearings of the State Department held for the purpose of considering Mexican concessions to U. S. exporters. Reed made public a letter from a representative of domestic fluorspar producers, who charged that proposed negotiations with Mexico denied to American producers interested in imports from Mexico their right to appear and present their views before any trade agreement is negotiated or concluded with any foreign country. Mexico unconditionally terminated the 1942 Trade Agreement as of December 20, 1947, by giving the required six months' notice and then increasing her own tariff rates to approximately those in effect prior to 1942. It was emphasized that the real intent of the State Department "apparently is to negotiate an entirely new trade agreement" with Mexico—without giving domestic producers an opportunity to be heard. The argument was presented that, since the old agreement has been terminated by Mexico, the current rate of duty on low-grade fluorspar should be that prescribed in the Tariff Act of 1930—$8.40 per long ton and not the $6.30 per long ton set in the 1942 agreement. The 1942 agreement also brought about reductions in duty on zinc, lead, molybdenum, antimony and graphite.

Russell Bill

Plans announced by Representative Russell (Rep., Nev.,) for amendment of his bill which has been on the House calendar, with a rule for floor consideration, since the summer of 1947. The bill would extend the Premium Price Plan for copper, lead and zinc with administration under a new Mineral Resources Division in the Department of Interior. The amendments now under discussion include placing administration under the Bureau of Mines; revision of the maximum premium clauses, substituting for the specific price ceilings a provision that the total of the market price plus the premiums shall not exceed the highest price paid during the war, but with an "escape clause" under which still higher prices could be paid if deemed necessary to acquire metal for the stockpile; and a requirement that as to all metal production resulting from premiums, an equivalent amount in quantity and quality be purchased by the Government and placed in the national stockpile.

Discussions have gone forward on another form of bill, originally considered at Denver in early February, under which the Treasury Department would make "incentive conservation payments" on the production of recoverable lead, zinc and copper at rates sufficient to return to each mine an operating margin equivalent to 25¢ per ton of crude ore plus depletion calculated at 15 per cent of net proceeds, but not to exceed 2¢ per lb of recoverable metal. Mines would be entitled to receive "incentive exploration payments" equivalent to two-third of the sums spent for such purpose, up to maximums for conservation and exploration payments of 7¢ per lb for the first 250 tons of recoverable metal produced each year, and successively lower rates on each 250-ton increment of production, down to 1½¢ per lb of metal produced in excess of 1500 tons and less than 2000 tons. Exploration and development work could be done in any potential copper, lead or zinc producing area in the United States or Alaska.

Submerged Lands

If the submerged lands bill, S. 1988, which would establish the titles of the states or their grantees to all lands beneath tidelands and navigable waters is enacted, it is reasonably certain that the measure will contain two amendments to protect the titles and possessory rights of persons holding mining claims which extend across the beds of "unmeandered" streams. These amendments are now contained in companion bills approved by both the Senate and House Judiciary Subcommittees. They define the term "lands beneath navigable waters" to include all lands which were covered by waters that were navigable under the laws of the United States "at the time such state became a member of the Union," and specify that, "the term 'lands beneath navigable waters' shall not include the beds of streams in lands now or heretofore constituting a part of the public lands of the United States if such streams were not meandered in connection with the public survey of such lands under the laws of the United States."

Secretary Julian D. Conover of the American Mining Congress had previously pointed out to members of the Senate Judiciary Subcommittee that under S. 1988, as originally introduced, the owners of patented mining claims and the holders of unpatented claims, who have derived their titles or right from the Federal Government, might now find these placed in jeopardy in cases where the claims extend across stream-beds—that a cloud might be cast over their titles through the action of the Federal Government in now granting, or quitclaiming, to the states the ownership of the lands and resources beneath any waters now or hereafter held to be navigable.

Coal Strike

The shutdown of the bituminous coal mines which began March 16 now awaits White House action on the re-

(*Continued on page* 101)

WITH AN EYE TO THE FUTURE

The Bituminous Coal Industry's Public Relations Agency Expands Its Information Services 3 Ways!

1. Women's Club Program

A complete discussion concerning coal, suitable for presentation to Women's Clubs throughout the country, appears in a recent issue of *Agenda*, the magazine that goes to 35,000 club program chairmen. Keynote of this unusual program is an objective picture of the role played by the coal industry in world economy. B.C.I. has tapped a powerful and interested opinion group through the sponsorship of this timely program. Free reprints of this material are offered to club chairmen and their speakers.

2. Entertaining Quiz Booklet

Just off the press, "Old King Coal Calls a New Tune" presents 24 pages of little-known facts about our coal industry. Since primary distribution is aimed at teachers and students, this booklet is offered free in a coupon appearing in scholastic advertisements.

3. Informative Radio Program

B.C.I.-sponsored "Congress Today" is now in its 21st week on Mutual Network Station WOL in Washington, D.C. Presenting Albert Warner's newscast direct from the Press Gallery in Congress, this radio program reaches the important Washington audience five days weekly. Newsworthy commercial announcements about our coal industry are an integral feature of each broadcast.

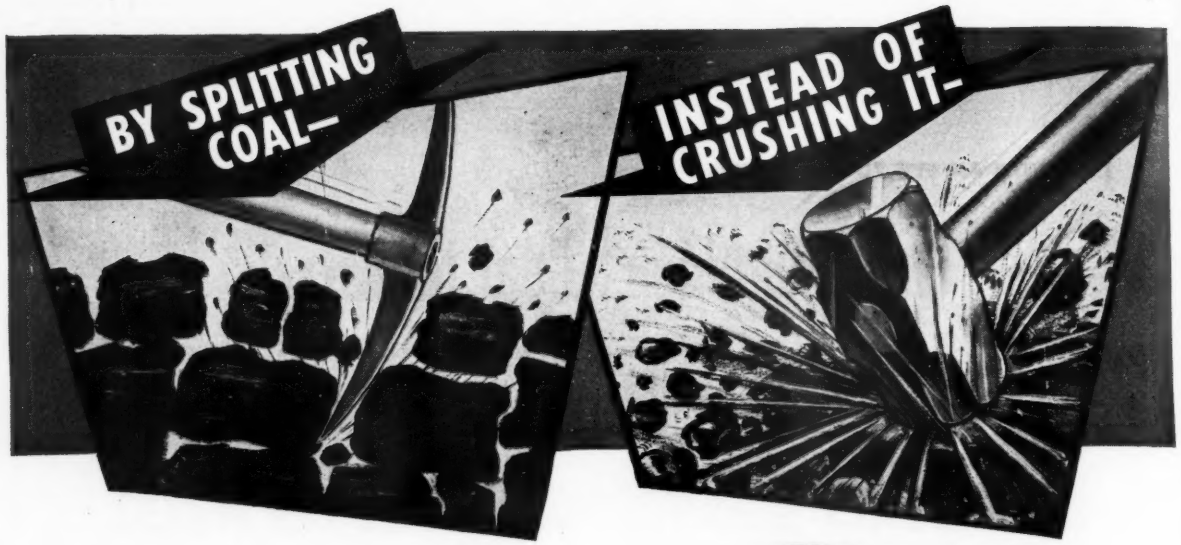
Part of a Long-Range Plan

These new activities are but one phase of B.C.I.'s comprehensive public information program. They strengthen the broad operations carried on through advertising, publicity, motion pictures, the Speakers' Bureau and the Education Department. This extensive public relations program is national in scope—local in effect. It works to the benefit of every segment of this industry.

BITUMINOUS COAL INSTITUTE

A Department of NATIONAL COAL ASSOCIATION
Washington, D. C.

Bituminous Coal . . . Lights the Way . . . Fuels the Fires . . . Powers the Progress of America



AMERICANS Minimize Fines and Produce Uniform Sizing

Nothing could better illustrate how American Rolling Ring Crushers give better control of fines than the example of splitting coal with a pick-axe contrasted to crushing it with a sledge hammer.

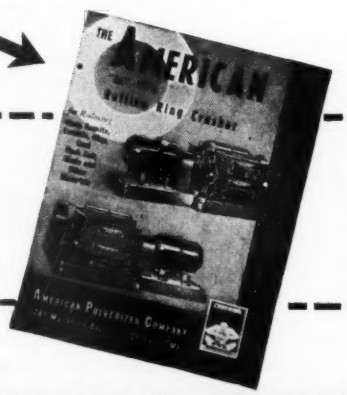
American's patented shredder ring action reduces ROM by cleavage impact rather than blunt shattering force. This makes possible a high tonnage rapid reduction while the rotor is revolving at slow power-saving speeds—resulting in less maintenance, minimum fines, uniform sizing and no oversize.

Whether your crushing is a one-step operation or a circuit, Americans maintain uniform sizing regardless of the range of reduction.

The American AC Crusher is designed and built for long dependable service. The entire frame is of sectional design with easy access to crushing chamber, lined with carbon and manganese steel sections.

MANY OPERATORS HAVE FOUND THE ANSWER IN HERE. Send for this free bulletin on coal crushing data and crusher specifications.

Only Americans have the splitting action of the Shredder Rings. Each shredder ring (shown at left) has 20 cutting edges. Rings revolve on individual shafts, free to deflect from tramp iron—eliminating the bother of shear pins or conventional safety devices.



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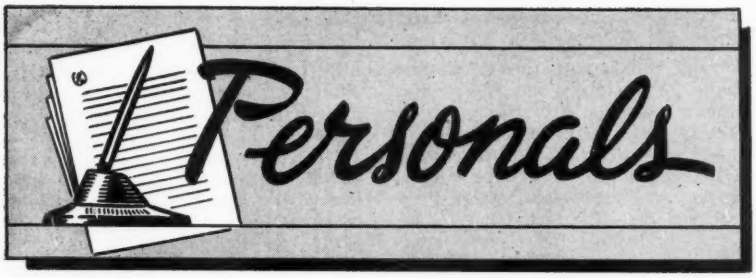

Charles L. Knaus, deputy mine inspector of New Mexico for the past year, has resigned, effective April 1, and is currently associated with the George S. Thomson Co., Inc., El Paso, Tex., mine supply firm, as its representative in New Mexico, Arizona, and Mexico. While serving as deputy mine inspector, Mr. Knaus carried out an intensive program of safety that reduced accidents in New Mexico mines to an all-time low in 1947. He is the author of a series of articles on mine safety published monthly in the *New Mexico Miner & Prospector*, official magazine of the New Mexico Miners and Prospectors Association.

M. D. Collier has been made acting manager of mines for the Logan Division of the West Virginia Coal and Coke Corp. Mr. Collier was formerly general mine foreman of the Jenkins mine of the Consolidation Coal Co. (Ky.).

Martial P. Corriveau, graduate of the Michigan College of Mining and Technology, has been appointed to the staff of Battelle Institute, Columbus, Ohio. He will be associated with the Institute's research activities in the field of ore dressing and mining technology.

Preston H. Haskell resigned from his position as vice-president in charge of coal mine operations and coal sales for the Alabama By-Products Corp. to become president of the Southern Minerals Co., Inc., operators of strip mines in northern Alabama.

Arnold A. Gustafson, who has been with the Freeport Sulphur Co. since 1934, recently was made operations assistant to the general superintendent at the firm's new mine at Grande Ecaille, La.

B. L. Rawlins has been appointed assistant general solicitor of United States Steel Corp. of Delaware.

At the same time, **LeRoy L. Lewis** was appointed as general attorney of Carnegie Illinois Steel Corp., succeeding Mr. Rawlins.

F. S. McNicholas, consulting engineer for Climax Molybdenum Co., is cooperating with other engineers and the highway department in plans for the proposed Loveland Tunnel, at Loveland Pass, Colo. In connection with their survey of the problem, the group plans to go through pioneer bore of the tunnel to make a first-hand study of existing ground conditions.

D. C. Helms, formerly production manager, has been named general manager of the Lehigh Navigation Coal Co., Inc., Lansford, Pa. **W. J. Parton** has been named assistant general manager and **F. E. Sterner** has become mining engineer for the company. **R. E. Hobart,** mechanical superintendent, who has been associated with the company for 59 years has asked to be relieved of his regular duties but continues with the company in a consulting capacity. **W. E. Connor** succeeds Mr. Hobart as mechanical superintendent and **Elwood Rickert** has been named superintendent of preparation.

G. T. Harley, manager, Potash Division, International Minerals & Chemical Corp., Carlsbad, N. Mex., has been elected president of the New Mexico Miners and Prospectors Association. Among other officers of this organization serving mining interests in New Mexico are **Geo. A. Warner,** first vice-president; **Joseph H. Taylor,** second vice-president; and **Jack C. Pierce,** secretary-treasurer.

G. T. Harley

S. J. Craighead, formerly superintendent of the Robena mine of the H. C. Frick Coke Co., has joined the United States Fuel Co. in Salt Lake City as vice-president and general manager.

A. H. Zeilinger, safety director for the Colorado Fuel & Iron Corp., Pueblo, Colo., and W. E. Jones, chief engineer, Climax Molybdenum Co., Climax, Colo., will attend the tenth Annual Western Safety Conference to be held in Hollywood, Calif., June 16-18, 1948.

R. W. Richardson is now commercial research engineer for the Calumet & Hecla Consolidated Copper Co., Calumet, Mich.

Carl A. Ilgenfritz, vice-president, purchases, United States Steel Corp. of Delaware, has been appointed by former President Herbert Hoover to a special committee of the Commission on Organization of the Executive Branch of the Government. The special committee will study the entire Government supply problem.

Joseph B. Perry, formerly mines manager in nonmetallic minerals for the Westvaco Chlorine Products Corp., has been appointed mines development manager. In this new capacity he will direct mineral exploration activities, mine property development, and beneficiation methods for Westvaco mining operations in California, Nevada, Idaho, and Wyoming.

John C. Kinnear, Jr., assistant smelter superintendent of Chino Mines Division, Kennecott Copper Corp., at Hurley, N. Mex., has been transferred to Kennecott's Nevada Mines Division at McGill, Nev. He is the son of John C. Kinnear, vice-president, Kennecott Copper Corp.

Ralph L. Brown, widely-known coal technologist, was recently appointed chief of the Bureau of Mines Coal Branch, Fuels and Explosives Division. For the past year, Dr. Brown has been serving as assistant chief in the Coal Branch at the Central Experiment Station in Pittsburgh, Pa. He succeeds Louis C. McCabe who resigned from the Bureau last September. Dr. Brown will supervise the Bureau's research in the mining, preparation, carbonization, and gasification of coal and related subjects at Bureau experiment stations and pilot plants throughout the United States.

M. O. Evans was recently promoted to the post of chief mining engineer at the Republic Steel Corp. of Pennsylvania. Mr. Evans was formerly assistant district manager. **J. H. Rietz,** former superintendent of industrial relations, has been promoted to assistant division manager.

— Obituaries —

The election of **A. B. Kinzel** as president of Union Carbide and Carbon Research Laboratories, Inc., has been announced by William J. Priestley, chairman of the board. Dr. Kinzel is the author of many important technical papers in the field of metallurgy.

A. B. Kinzel

During the war, in addition to his work for the Manhattan district, Dr. Kinzel was senior consultant on metals for the War Production Board and held other vital offices.

Monroe J. Mechling, formerly with the U. S. Bureau of Mines at Greensburg, Pa., has been named head of the Bureau's new sub-district office at St. Clairsville, Ohio. From this office inspection in the four northern counties of West Virginia and all of Ohio will be directed.

R. B. Tempest, Jr., on the engineering staff of Nevada Mines Division, Kennecott Copper Corp., at Ruth, Nev., has joined the engineering staff of Chino Mines Division, Kennecott Copper Corp., at Santa Rita, N. Mex. During World War II, Tempest was a commissioned officer in the United States Army. He is a son of the late R. B. Tempest, who for ten years was general manager of Chino Mines.

M. D. Collier has been promoted as acting manager, Logan Div., West Virginia Coal & Coke Corp.

Charles B. E. Douglas, consulting engineer for United States Smelting Refining and Mining Co., has recently been transferred to the Salt Lake City office.

According to a recent announcement **R. C. Denney** has been named general manager of the Black Gold Coal Co. Mr. Denney was formerly with the West Virginia Coal & Coke Corp. The Black Gold Coal Co. will operate the Tierney mine.

William Pugh, plant foreman at the Phelps Dodge Corporation's smelter at Douglas, Ariz., retired the first of February, following 39 years of service.

Harlowe Hardinge, president of the Hardinge Co., Inc., of York, Pa., has been elected a director of the Pennsylvania State Chamber of Commerce for a two-year term.

Frank E. Shepard, former director of the Denver Mint, recently died in Denver. Born in New Hampshire in 1865, Mr. Shepard was graduated from the Massachusetts Institute of Technology in 1887. When he came to Denver, two years later, interest in mining directed his activities. He became president of the Denver Engineering Works, specializing in the development of mining machinery. From 1923 to 1933 he was director of the Denver Mint. At the time of his death he was associated with the Denver Equipment Co. and was a director of the Public Service Co.

H. Foster Bain, internationally-known geologist and mining engineer and former director of the U. S. Bureau of Mines, was stricken with a heart attack and passed away on March 9 in the Santo Tomas Hospital, Manila, P. I., at the age of 76. He was in the Orient for American mining interests when the attack occurred. Strangely, Dr. Bain died at the place where he had been interned for two years during the war. His death came as a great shock to his multitude of friends and associates in the mining industry.

For more than 50 years, Dr. Bain had been a prominent, inspiring leader in the mining world. Shortly after his graduation from the University of Chicago, in 1897, he was assistant state geologist of Iowa and later director of the Illinois Geological Survey. After a period of years in editorial work, both in the United States and in England, he became director of the U. S. Bureau of Mines in 1921. He resigned from the Bureau in 1925 to become secretary of the American Institute of Mining and Metallurgical Engineers. In addition to contributing many valuable papers and articles on mining subjects he was the author of "Types of Ore Deposits," "Ores and Industries of the Far East," and "Ores and Industries of South America."

His was a keen and active mind and he had the ability to analyze and draw rapid, accurate conclusions on all types of mining problems. In 1936, recognizing his great ability, Manuel Quezon, then president of the Philippine Commonwealth, requested Dr. Bain's services as advisor on mining to the Philippine Government. When the Japanese invaded the Islands, he was interned at Santo Tomas, where he played an active role in camp affairs. He conducted a series of talks on mining, for engineers, and busied himself in binding books for the camp library.

Upon his repatriation to the United States, Dr. Bain acted in a consulting capacity to the Government on mineral surveys connected with the war effort. In 1945 he was a member of the six-man National Engineers Committee organized to prepare a postwar plan to destroy Japanese industrial war potential without crippling the entire economy of Japan. For several years Dr. Bain had been associated with Behre, Dolbear & Co.

Dr. Bain had a great love for the Philippine Islands, despite his years of internment there. Those who knew him well, can understand his sentiments when he made the now-completed request that his ashes be strewn over Manila Bay.

William Snead Graham, district manager in Norfolk, Va., for Eastern Gas and Fuel Associates, died suddenly at his home in Norfolk on Feb. 15, following a heart attack.

Mr. Graham had been district manager since 1928, representing the Coal and Mystic Steamship divisions of Eastern Gas, as well as Castner, Curran & Bullitt, Inc., and New England Coal & Coke Co.

Rollin T. Chamberlain, 66, died early in March in Chicago. A noted geologist, Dr. Chamberlain devised methods of rock dusting in mines to cut down danger of coal dust explosions. After 35 years on the faculty of the University of Chicago, Dr. Chamberlain had retired as professor emeritus of geology.

Robert E. Phelan, 61, mining engineer and former manager of Basic Magnesium Company's plant at Las Vegas, Nev., during the war, died at Carson City, Nebr., Feb. 20, 1948.

Charles N. Bell, Sr., of Golden, died in February from pneumonia. Mr. Bell had served as president of the Colorado Mining Association for three years and was appointed to the Mineral Resources Board by Governor Knous. Mr. Bell had long been active in mining and was president and manager of the King Lease, Inc., operating the Camp Bird mine at Ouray; president of the Virginius Mines Co.; director of the Cresson Consolidated Gold Mining and Milling Co.; general manager of Smuggler Union mines at Telluride; mining engineer for the Champion Trio Mining and Milling Co., and the New England Exploration Co.

Federal Anthracite Laboratory Under Construction

Construction plans of the $450,000 Bureau of Mines Anthracite Laboratory at Schuylkill Haven, Pa., are being formulated and actual construction will begin this fall. The anthracite industry received this important news through a letter from Secretary of the Interior J. A. Krug to R. E. Taggart, president of the Philadelphia and Reading Coal and Iron Co., which donated the tract of land for the laboratory site. Legal considerations concerned with the transfer of the land has held up plans and bids for the construction of this laboratory. When the U. S. Attorney General ruled the deeds were valid, plans were pushed to go ahead with construction. The architects' preliminary drawings for the laboratory have been approved by the Director of the Bureau of Mines. Mr. Krug's letter stated that every effort will be made to expedite planning and construction to make the facilities of the laboratory available to the anthracite industry as quickly as possible.

Pittsburgh Consolidation Purchases Operating Coal Mine

In a recent negotiation, the Eastern Gas and Fuel Associates' Federal No. 3 mine at Everettville, W. Va., was sold to Pittsburgh Consolidation Coal Co. interests. The mine was taken over April 1 and operated by Consolidation Coal Co. (W. Va.).

Federal No. 3 mine is located midway between Fairmont and Morgantown, W. Va., on the lines of the Monongahela Railway. Three sides of the newly-purchased operation already belonged to Consolidation which will continue to operate the Federal No. 3. The new acquisition provides additional reserves which will be worked when the present mines are exhausted. The Federal No. 3 operates as a drift mine in the Pittsburgh seam.

Eastern Kentucky Group Meets

The first meeting of the recently-formed Eastern Kentucky Electrical and Mechanical Institute was held in Jenkins, Ky., at Lakeside Hotel Monday, March 8. Some 60 persons from Eastern Kentucky and neighboring Virginia, representing 15 different companies, were present to hear C. E. Hugus, Jr., field engineer for the Reliance Electric & Engineering Co. of Cleveland discuss the application of motors on mechanical loading equipment.

A preliminary meeting was held on February 18, when George Leatherman of Inland Steel Co., Wheelwright, Ky., was named acting chairman, and Lee Siniff of Consolidation Coal Co. (Ky.), Jenkins, Ky., was named acting secretary. Permanent officers will be elected at the next meeting.

Those present were dinner guests of Consolidation Coal Co. (Ky.).

Meetings will be held monthly and the next meeting is scheduled for Monday, April 12, at 7:30 p. m. in the Wheelwright Club House, Wheelwright, Ky., when Thomas R. Weichel, mining-electrical engineer of the U. S. Bureau of Mines, will address the meeting on the "Use of the Frame Ground on Coal-Mine Equipment."

Reclamation Method School Held

With the constitutionality of the Bituminous Open-Pit Mining Act in Pennsylvania decided, the Mineral Producers Association, Kittanning, Pa., formed a school of instructions to assist its members in meeting the provisions of the Act.

Among the subjects discussed at the two-day school held on Feb. 25 and 26, were the requirements of the Act, the procedure required by the department, the characteristics of the various trees, shrubs and grasses, the soil, climatic requirements of each, the utility of crop at maturity, and planting methods. A number of other specific problems were discussed which had to do with the method of determining character of the soil in spoil banks, the areas especially suitable for grasses and shrubs, and the proper method of handling and planting stock in addition to a number of other subjects.

IMCC Plans Second Mixing Plant

International Minerals & Chemical Corp. is planning to erect a second fertilizer mixing plant in North Carolina in the near future. The plant will produce approximately 20,000

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tons of complete fertilizers annually to meet expanding demands.

The Winston-Salem plant will utilize potash from the company's mine in Carlsbad, N. Mex., and superphosphate from its phosphate mines at Bartow, Fla.

AIME 76th Annual Meeting

Between Feb. 15-19 more than 2000 mining and metallurgical engineers met at the Pennsylvania Hotel, New York City, on the occasion of the 76th Annual Meeting of the AIME. The technical program ranged from subjects concerned with mineral industry education through mining methods, mining geology, coal mining, eastern magnetite mining and milling, milling methods, nonferrous metallurgy, industrial minerals, and mineral economics.

Outstanding among the technical sessions held was the all-day discussion of important topics in the field of mineral economics held on the last day of the meeting. Dr. James Boyd, director, U. S. Bureau of Mines, started this meeting with a paper on "Mineral Policy Developments in Washington." Military and mineral strategy of the great powers was presented by Col. G. A. Lincoln, professor, Social Sciences, U. S. Military Academy, West Point. Evan Just, editor, *Engineering and Mining Journal*, presented a thorough treatment of the subject "Subsidies for Domestic Mineral Producers." "Gold vs. Inflation," an extract of his paper appearing in the February Annual Review issue of MINING CONGRESS JOURNAL, was presented by D. H. McLaughlin, president, Homestake Mining Co.

Offsetting the intense three-hour technical meetings were luncheons held by the mining geology, mining methods and other committees. A dinner-smoker was held on Monday night and an informal dance on Tuesday night. At the Annual Banquet, held on Wednesday, Clyde Williams, president of the AIME during 1946, made a number of awards and installed W. E. Wrather, director, U. S. Geological Survey, as president of the Institute for 1948.

Railway Plans Building 1000 Coal Cars

According to recent reports the Norfolk and Western Railway is planning to build another 1000 all-steel, 70-ton coal cars. Completion of the building program being carried on by Norfolk and Western will bring the number of their coal-carrying cars to well over 50,000.

U. S. Steel Opens New Mine

Plans have been announced by the U. S. Coal & Coke Co. that they will develop a new mine at Lynch, Ky., for a daily production of 5000 tons.

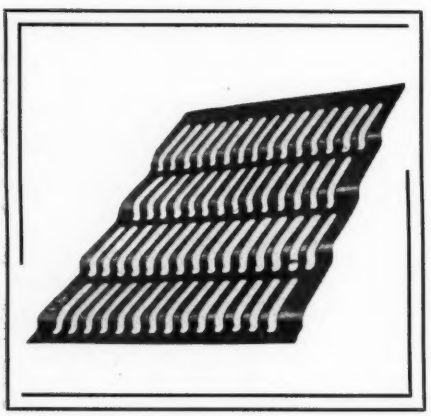
Harry M. Moses, president of the U. S. Steel Corp. subsidiary said that the completely mechanized mine will insure continued coal-mining activities in the community. Operation of the new mine will offset the normal depletion of coal that will take place over the next several years in existing mines. Work on the new project will begin immediately and it is expected that the mine will go into production early in 1949 with the bulk of the output going to the U. S. Steel Corp.

New Coal Test Planned

According to recent reports, the U. S. Bureau of Mines and the Alabama Power Co., cooperating, will speed up plans and research into the problem of making synthetic fuel by the gasification of coal underground.

This time the experiment will be carried out in a similar manner to the experiments made at Gorgas, Ala., last year, but the coal seam to be tested lies at a depth of 100 to 125 ft below the surface. On the new test a massive war surplus turbo-

HENDRICK COAL MINING EQUIPMENT



Flanged Lip Screens—For screening coal, Hendrick Flanged Lip Screens are outstanding because of their non-clogging operation, plus their accurate sizing and rapid dewatering advantages. Furnished with short, medium or long slots, in over 150 different standard sizes of openings.

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compressor supplying the air at a much higher pressure will be utilized. The previous test obtained gas with an approximate fuel value of 50 Btu but the proposed test aims at a goal of producing 150 Btu gas.

The new experiment will use a line of vertical shafts, drilled down to the coal, which shafts will be connected by horizontal openings through the coal. Fires will be started at the bottom of the shafts and at points located between the vertical shafts. Air under pressure will be forced down one set of shafts and the resultant gas drawn off of another set of shafts. Secondary shafts will be drilled ahead of the burning area as the fire progresses.

In the new test it is planned to experiment with periodic quenching of the fires with steam in an attempt to increase the Btu value of the gas produced.

It is reported that another experiment in underground gasification of coal begun by the Union Carbide & Carbon Corp. of West Virginia is continuing. No results have been reported to date.

Recent Promotions at Consolidation Coal Co. (Ky.)

Howard L. Riffe and T. J. Davis, both of whom have been repairmen at Mine 155 for a number of years, have recently been promoted to maintenance foreman and assistant maintenance foreman, respectively, at the same mine. Isom Bunch, timberman, at Clover Splint Mine for several years, has been promoted to a section foreman at that mine. Arlie Webb, who returned from military service in February 1946 and has since been fire boss at Mine 207, has been promoted to section foreman at Wright Mine. Charles L. Adams, who has been employed at Mines Nos. 155, 207 and 204 for a number of years, has been promoted from repairman at Mine 204 to assistant maintenance foreman at the same mine.

Anthracite Silt May Be Utilized as Fuel

Frank W. Earnest, Jr., president of the Anthracite Institute, recently announced that a huge new source of fuel will be made available in coming months. His statement is based upon a new process for converting millions of tons of anthracite silt into fuel gas. This former waste material has been accumulating at mine heads for many years and it is estimated that about 200,000,000 tons are immediately available for conversion. This tonnage represents about four years total production of all anthracite as the average annual production of anthracite is about 50,000,000 tons. Additional resources of anthracite silt utilizable for gas conversion can be anticipated as 10 per cent of anthracite production is silt. By varying the combustion methods, anthracite silt can be processed into three different gases, according to Dr. Raymond C. Johnson, vice-president in charge of research of the Anthracite Institute.

Industrial Hygiene Foundation Acquires Laboratory

In addition to carrying on its activities in supporting research work and making plant and field studies, the Industrial Hygiene Foundation is taking over a laboratory at the Magee Hospital which is a part of the University of Pittsburgh Medical Center. The funds that made possible this new step in the expansion of the Foundation's activities were made available entirely from contributions made by members towards the Foundation's Research Fund.

Plans call for the development of the new laboratory to undertake toxicology studies, including animal work; research in industrial hygiene methods along the line of development of new instruments, methods of analysis, and procedures; and engineering research under controlled laboratory conditions, such as air cleaning methods, ventilation requirements, etc. The facilities of the new laboratory will be for the primary use of the membership of the Foundation.

West Virginia Mine Plans to Mechanize

According to a recent report, Youngstown Mines Corp., a subsidiary of Youngstown Sheet & Tube Co., located at Dehue, Logan County, W. Va., is planning to mechanize its 2200 tons per day coal mine. In conjunction with the mechanization program it is reported that a new coal cleaning plant is being designed.

H. C. Frick Coke Co. Closes Three Plants

Three Frick Coke Co. plants at Uniontown, Pa., will be shut down permanently, general superintendent J. L. Sullivan announced. They are the Continental No. 1, Crossland, and Dearth plants.

"Because of the new additions to U. S. Steel by-product coke plants, the beehive coke plants at Uniontown are no longer necessary," Mr. Sullivan said.

Fulton Brattice Cloth is mildew, fungus, and rot resistant. Its uniform and lasting qualities and economy are well established. Fulton Fireproof Brattice Cloth is made in two weights, and in widths from 36 to 96 inches. Leading mine supply houses in all coal fields stock Fulton Brattice Cloth from our plant nearest you. Immediate shipments are available.

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The Parmanco Horizontal is adapted to all forms of high-wall drilling, will handle a six-inch auger up to a distance of sixty feet or more and, by use of our patented augers with interrupted flights and secondary cutters, will drill an absolutely clean hole with a minimum of torque. It permits the drilling of a controlled-angle hole which makes possible a great saving of explosives through the cantilever effect of this controlled-angle drilled hole.

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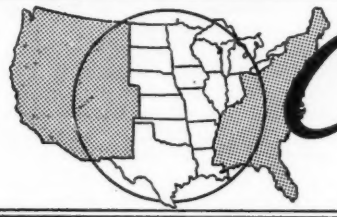

Central States

Consultant Asserts U. S. Zinc Production Can Supply All Domestic Needs

Frank Eichelberger, Spokane consulting mining engineer, and director and chief engineer for the United Zinc Smelting Corp., has stated "this country has been profligate in respect to its mineral resources, with no regard for proper economic balance. The United States can continue to be independent of the rest of the world in zinc production, and we must restore such marginal areas as the Tri-State, which at one time produced 60 per cent of this country's zinc and nearly one-half of the world's output. It is a fight for the existence of the local mining industry and similar areas in the country. It is logical that the government will aid our industry if the people are educated to its importance and an active appeal is made to Congress through our chamber of commerce and civic organizations."

Recently Mr. Eichelberger spent several days in the Tri-State district on a periodic inspection of the company's operations.

Oronogo Discontinues Pumping Operations

Early in March a decision was reached to discontinue pumping operations at Oronogo Mutual Mining Co. in the Tri-State district and permit the mines to become flooded. According to Guy H. Waring, manager of the company, the decision was made because no action had come to provide Federal assistance to marginal ore producers and their own operations had become unprofitable when premiums were cut off. The minable ore reserve at the Oronogo area is estimated at 500,000,000 tons or more and the district, according to Mr. Waring, could continue to produce over a period of years provided the government inaugurates some incentive program favorable to marginal producers.

Frank Fenix, former state mine inspector, said that all underground booster pumps and mining equipment had been removed before shutting down the pumps. Once the ground fills up it will require at least three months and an expenditure of some $50,000 to unwater the mine, according to Mr. Fenix.

The Oronogo Mutual Mining Co. continued operation through December after premiums went off even though operations were no longer profitable. Pumping was continued until March 1 in the hope that Congress would take action by that time.

Large Deep-Well Pumps Serve Fluorspar Mine

In the fluorspar mining district at Rosiclare, Ill., pumping constitutes a sizable percentage of total operating costs. The nearness of the Ohio River requires that regular water pumping be carried on when the river is at normal level but greatly increased rates of pumping must be attained when the river is at flood stage. Located only a short distance from the Ohio River, the Rosiclare Lead & Fluorspar Mining Co. is the principal mining operation in the district. The mine is equipped with every pumping facility for most normal and abnormal water conditions. A deep well standby pump with a capacity of 3200 gpm is located on the surface within a few hundred ft of the shaft. A 16-in. diam suction column handles the output of the pump.

For normal pumping there are four 1000 gpm centrifugal pumps located underground which discharge against 700 ft of static head.

Pegmatite Deposit Drilled

Under a contract with the USGS, the E. J. Longyear Co. is diamond drilling a pegmatite deposit near Custer, S. Dak. The deposit now being drilled lies west of Custer. The Survey's field office at Custer is under the direction of Dr. Lincoln Paige.

North Range Sinks New Shaft

At the Book iron mine at Crystal Falls, Mich., the North Range Mining Co. is now sinking a new shaft to supplement the present inclined shaft through which the mine was originally opened. The Book iron mine is located on the Menominee iron range.

In addition to this work, the North Range Mining Co. is unwatering the Champion iron specular hematite property, located 14 miles west of Ishpeming, Mich., on the Marquette iron range. Pumping operations have been in progress since the power line was extended to this idle property and by March 1, 1948, the water had been lowered 200 ft in the shaft. It is estimated that about Aug. 1, 1948, unwatering will be completed. The current rate of pumping is 3000 gpm. On the incline the principal shaft of the Champion mine measures 2314 ft or has a vertical depth of about 2000 ft. This mine is one of the old timers in Marquette County, Mich., as the records indicate that the first shipment of ore was made in 1867.

Indiana Coal Producers Plant Seedlings

Indiana's largest forest planting project was started with delivery to planting sites of the first of nearly 1,500,000 seedlings grown in Indiana state nurseries. The trees, which include 12 varieties, will be set out on lands mined by members of the Indiana Coal Producers Association, who have planted nearly 23,000,000 trees in Indiana. Their reclamation pro-

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gram dates back to the World War I period when open-cut mining first came into wide use in Indiana.

L. E. Sawyer, director of the Association's division of forestry and reclamation, said the trees to be planted this year will be apportioned over 2088 acres of land in nine different counties.

Seedlings are purchased by the Association from the Jackson County, Clarke County, and Jasper-Pulaski state nurseries. Varieties to be used include pitch, virginia, jack and red pine, maple, sycamore, tulip poplar, walnut, locust, and white and cork oak.

Seedlings delivered from the state nurseries are placed in heeling-in beds and will be redistributed from them to the planting crews. Under the planting methods worked out by Mr. Sawyer, each seedling is given individual care until it reaches its final planting spot.

Cost of planting stock and planting labor is borne entirely by the mine owners. Members of the Indiana Coal Producers Association, who conduct this organized reforestation program, produce approximately 90 per cent of the Indiana coal recovered by stripping.

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Investigate the advantages of Pure Oil lubricants and service for the protection of vital mining machinery. Our lubrication engineers will be glad to discuss your problems —without obligation.

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Monsanto to Build Plant at Marion, Ohio

The Monsanto Chemical Co. has announced plans for construction of a $5,000,000 plant in Marion, Ohio, for investigation of the basic chemical problems in the field of atomic energy.

The construction contemplated will take about a year and will get under way early in April. The company has work nearing completion on another atomic energy installation at Miamisburg, ten miles south of Dayton, Ohio.

Hydraulic Transportation of Iron Ore

In preparation for the opening of the ore season, the Stanley Mining Co., located at the Mary Ellen mine, Biwabik, Minn., on the Mesabi iron range, is readying its beneficiation plant. This operation is unusual as all primary and secondary crushing of the banded taconites takes place in the open pit. Fine material is then hydraulically transported to a heavy-media separation plant located on the surface. The hydraulic transportation of ores has seen little practical application today but more news of this new transport method may be expected in the future. Emmett Butler is president of the Stanley Mining Co. and Frank S. Bergstrom is in charge of operation.

Treatment of Low Grade Planned

It has been reported that the Charleson Iron Mining Co. at Hibbing, Minn., is now designing a plant to treat a large stock of low grade iron bearing materials, which it has under lease in the state of Minnesota. Tests have been made and building of the plant will begin this year.

The former operators of this stockpile, located at the Missabe Mountain mine in Virginia, Minn., accumulated the low grade iron ore. Both mine and stockpile are held under lease by the Charleson Iron Mining Co.

C & H Active in Exploration

Development work in the lower levels of the Centennial mine is under way. Shaft sinking has been resumed below the 34th level at the North Kearsarge mine. On the 15th level of the Houghton conglomerate, a drift is being driven to the north. Shaft sinking from below the 25th level has begun at the Seneca mine in Michigan.

In addition to the work being carried on in operating mines, Calumet and Hecla is actively diamond drilling for new deposits. However, to date, most of the new findings have been too low grade to be operated profitably at this time.

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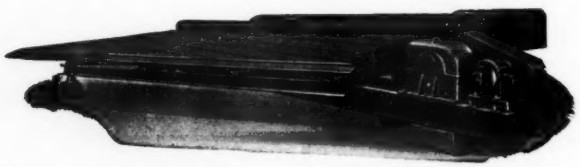
Two Tri-State Operations Terminate Activities

M. H. Loveman, manager of Tri-State Zinc, Inc., and Missouri Mining Co., recently announced the termination of the two companies' operations in the Tri-State district. Fiscal assets of the two companies will be liquidated. Tri-State Zinc, Inc., has disposed of two tailings plants at Picher, Okla. The Ottawa plant has been sold to the Cardin Electric Co. and the General Steel Products Co. and the Sooner plant has been sold to the Sooner Milling Co., Inc., which is owned and will be operated chiefly by former employes. The Chitwood retreatment mill and other equipment of the Missouri Mining Co. has been sold to General Steel.

Offices of Tri-State Zinc have been moved to Galena, Ill., where the company has taken over a number of mining leases and is reported to be exploiting several good deposits of zinc ore.



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Old Mining Area Dewatered

An extensive pumping program in the old Crestline mining field, about two miles east of Crestline, Kans., has been begun by F. W. Evans of Joplin, Mo. Originally opened more than 25 years ago, at one time the Crestline field had five mills which treated ore from more than a dozen mines in the district. The most recent operations were carried on by the Eagle-Picher Mining and Smelting Co. about 17 years ago.

Mr. Evans has leased several acres in the Crestline mining area. An 8-in. Peerless pump has been installed in a 24-in. drill hole near the old Ellis shaft, which extends to a depth of 180 ft. Pumping operations began on this shaft last March. Two additional 8-in. Pomona pumps were subsequently installed in the Ellis shaft and are now lowering the water at the rate of approximately 2 ft per day.

Another 8-in. pump installed in a 24-in. drill hole near the old Crutchfield mill shaft, which is about 200 ft deep, began pumping in March. Plans call for the installation of two additional pumps in this shaft.

It was estimated that approximately three months will be required to dewater the entire area as the pumps are now throwing about a total of 6000 gpm. Once the ground has been dewatered the inflow is not expected to be greater than that which can be handled by a 6-in. Triplex pump.

Iron Ore Concentrator Sold

Recently the surplus iron ore concentrating facilities at Iron Mountain, Mo., were sold to the Ozark Ore Co. for $340,000.

These facilities were installed during World War II to increase the production of iron ore concentrates. Mining equipment was included in the sale.

Production Tests Continue on Titanium-Zirconium

Test work by the Bureau of Mines at its Boulder City, Nev., and Albany, Oreg., plants continue. Titanium is being produced at the Boulder City plant at the rate of about 100 lb per day and zirconium is coming from the Albany pilot unit at a rate of about 65 lb per day. Present production costs are at about $4 per lb for titanium and slightly more for zirconium. If the current budget permits, the Boulder City plant will be expanded to produce about one ton a day of titanium some time this year.

Oregon Copper Producer to Reopen

Plans have been made to reopen the Copper Queen mine in Josephine County, Oreg., by open-pit methods. Originally located in 1916, the Copper Queen was worked from time to time, usually by underground methods. The last work done at the mine was in 1941. A previous report covering two carloads of ore shipped in 1934 states that 44.81 oz Au and 229.83 oz Ag were recovered.

Robert Cannell of Semi, Calif., is the new owner of the property which he purchased from O. S. Blanchard and Herman Schmidt, of Grants Pass, Oreg. The new operations are to be under the direction of Tom Cannell of Sunny Valley.

Callahan Consolidated Finances Long Crosscut

Callahan Consolidated Mines Inc., has entered into an agreement whereby it will assist the Coeur d'Alene Mines Consolidated Co. in driving a crosscut through the silver belt from the 2800 level of the Coeur d'Alene Mines Corp. This crosscut will cut through the entire silver belt, or through the mineralized zone as estimated by geologists at present. About 3200 ft of this work has already been accomplished under contract to the Coeur d'Alene Mines Corp. The remaining 2800 ft will be financed by Callahan Consolidated Mines Inc. According to information furnished the stockholders, Callahan Consolidated Mines Inc. will receive in return a 7½ per cent interest in the ore found in the American Silver vein; 12½ per cent in the Silver Standard vein, and 37½ per cent in the Freeman & Sites and the Michaels & Fahle veins, and 75 per cent of Coeur d'Alene Mines Consolidated interest in the entire project until the cost price of the operation has been returned. It is estimated the cost of driving the 2800 ft will be around $95,000 and will take at least a year.

Shaft Contracts Let

Development and exploration on a major scale is now under way in the Silver City mining area of Grant County, N. Mex., that in the next two or three years is expected to practically double the production of copper, zinc, and lead in that area. Contracts have been let by the American Smelting and Refining Co. and the United States Smelting Refining and Mining Co., and work started on two shafts, 1500 to 2000 ft deep, to tap new ore bodies and make possible greatly expanded operations. Present mining operations by these two major companies, together with Chino Mines Division, Kennecott Copper Corp. doubtless may set new production records for New Mexico's largest metal mining district.

Power Shortage Affects Nevada Mines

Serious power shortages in western Nevada and northern California brought difficulties to the mining industry in western Nevada. Consumers of electric power have reverted to "brownouts" and "daylight saving" is in effect in most communities. Some industries are on a one-day-less operating basis and the shortage threatens the agriculture and cattle interests.

The shortage is due entirely to lack of rainfall in California, and snowfall in the Sierra Nevada Mountains. Virtually all power in this region is hydro-electric, and the dry spell has almost emptied reservoirs that supply the water for power and agricultural purposes.

Nevada's biggest power company obtains most of its current from a California producer which has been compelled to curtail "juice" to all customers. Western Nevada mines have been asked to curb use of power and even Reno's neon signs have been ordered cut to the utmost minimum.

Flotation Mill Completed

The Western Mining and Milling Co. has constructed a 75-ton flotation mill at its property about 11 miles from Prescott, Ariz. The mine, formerly known as the Chase or Sheldon Superior, has been under development by the present operators for about a year. The ore is complex, carrying metal values in lead, zinc, copper, gold, and silver. J. E. Nee, Box 975, Prescott, is directing the operation.

Elk Mountain Stripping Operations Begun

A large-scale stripping operation in the Elk Mountain district of Carbon County, Wyo., was begun last month by the Shirley Coal Corp. Superintendent of the new operation is William H. Bonham and the president of the corporation is Lawrence Loechner.

BEE-ZEE Screen Opening Stays Same Size Longer

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Puts the Working Miners INSIDE the Fresh Air Zone

An authoritative article on mine ventilation in Coal Age (December, 1946) states:

"Most miners work ahead of the crosscuts through which the fresh air current moves. Very little, if any, air moves in the average working place unless supplementary means are provided. . . . Line brattice is the best-known means of getting fresh air to working faces."

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is the time-proved material for directing the flow of fresh air to the men and for sealing off dead areas. It's made for rough handling, and is treated by our exclusive processes to resist flame, fungi, shrinkage and leakage. Two durable grades. Long service life makes ABC Brattice Cloth economical.

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Let ABC convert your working faces into fresh air zones. Write for samples, or ask your ABC mine ventilation engineer.

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Electrification of Kennecott Railway Nears Completion

According to the 1947 annual report of the Kennecott Copper Corp., construction of the new electrified ore haulage railroad which connects the mine with the mills of their Utah operation will probably be completed in April. Soon after that it is planned that the operation of the Bingham and Garfield Railway will be discontinued and the company dissolved.

Rex Mine in Idaho Has New Owners

Day Mines, Inc., have exercised their option to purchase the mining property formerly known as the Rex mine and the 100-ton mill formerly operated by Callahan Consolidated Mines Inc., which has been shut down since July, 1946.

Goldstone Mine Refinanced

With the Government's restrictions finally removed on gold mining, the Goldstone mine, formerly operated by the late James F. McCarthy, president of Hecla Mining Co., Wallace, Idaho, and the late James Fitzpatrick, president of the Union Iron Works of Spokane, Wash., is again to undergo development. The company has undertaken new financial development for the reopening of the mining property.

Hailey Shows New Life

A modern custom milling plant for treatment of silver-lead-zinc ores is planned for the old Hailey mining camp in Blaine County, Idaho. A group of businessmen, organized at Hailey, have pledged $50,000 towards construction of a 150-ton flotation plant at the mouth of Bullion Gulch. Thirteen mines operate in the county.

Nevada Mining Looks to Active Year

Even if mining in Nevada in 1947 took a "bad beating" A. E. Bernard, state mine inspector, declares the outlook is bright for big mining developments this year. After completing a trip to mining districts in Lander, Churchill, and Eureka counties, he reports that approximately 50 mining operations have commenced work since the end of 1947.

Most of the work is in old operations which were shut down under order L 208. They are not big mines—not yet at least—but they are paying properties, says Bernard. He reports most activity in Austin, at the Summit King mine in Churchill County and much work at the old camp of Eureka, where there is more mining activity than in any other part of the state.

Diamond Drilling Discloses Ore

There is new activity at the Christino Rivers mine of the Pecos Mining Co. near Terrero, San Miguel County, N. Mex. Diamond drilling of the property has been completed by Ken Garad, in charge of operations. He reports several thousand tons of milling ore developed on the 100- and 200-ft levels. A two-shift force of miners will be put to work, with production planned of 75 tons of ore a day.

Mace Smelter in Rock Wool Production

The Central Mining & Development Co. is reported to be installing a Mace smelter on the National Mine claims near Central City, Colo., for the manufacture of rock wool. Precious metal recovery will be a by-product. Two furnaces will be operated.

Nabob Tunnel Shows Rapid Advance

The deep Nabob tunnel on Pine Creek has been driven a distance of 4000 ft at a speed of around 10 to 12 ft per day and is now nearing the mineral zone in which the Sidney and Highland-Surprise mines are located in the Coeur d'Alene district in Idaho. The Sidney and Highland, at 600 ft less depth, have both recently developed zinc-lead orebodies of more than usual size and importance. Both have large milling plants. Nabob has a mill of 300 tons capacity treating ore from upper workings pending completion of the tunnel development.

Open-Pit Coal Mine Planned

From Mendocino County in California come reports that stripping operations for mining a coal deposit near Dos Rios, Calif., are progressing. More than a mile of access road has been built from the highway to the deposit.

Kennecott Set to Build New Refinery

An important step in the integration of its domestic copper operations will be taken by Kennecott Copper Corp. in building a new refinery adjacent to its mines at Garfield, Utah. The plant, scheduled to be started this year, will have an initial capacity of 12,000 tons of refined copper a

month. It will treat ore from the western mines which formerly was shipped to eastern refineries.

Sunset Copper Will Extend Shaft

The Sunset Copper Co. expects to resume work at an early date on 17 lode claims, 20 miles northeast of Florence and 9 miles from Superior, Ariz. The mine has been opened by a 600-ft inclined shaft which the management now proposes to sink to contact the sulphide zone. According to W. O. Kay, 213 Minna Street, San Francisco 3, Calif., vice-president and general manager, previous work was done with gasoline-powered equipment, but present plans call for a new hoist and Diesel equipment.

High Cost Closes Argonaut

Since its discovery in 1850, the Argonaut has been one of the most famous of "Mother Lode" mines and a husky part of the backbone of California's gold production. Today, with the narrow spread that exists between costs and the amount receivable from the sale of product, many gold mines are finding their difficulties increasing. Hence, although there is considerable ore left in the Argonaut, operations have ceased. Actually 1941 was the last full year of operation. Profits in that year were so slender as to make continued operations hazardous.

Getchell Mine Revamps Flowsheet

Officers of the Getchell Mine Inc., Nevada, have just announced that their engineers are currently formulating plans for major expansion of production facilities. Early installation of a new crushing and grinding circuit is under way which will consolidate the fine ore bins. An efficient low-cost flow sheet is being developed.

What may be an important factor in mining the Getchell's gold ore, as well as extracting the metal, is a new modification of the carbon-cyanidation treatment of the slime portion of the ore.

Prospect Ships Rich Copper Ore

The Hansey Copper & Gold Mining Co. is opening a new copper mine at Adair, on the St. Joe River, south of Wallace, Idaho, according to Sam Peterson, part owner and manager. He says the prospect work has opened an orebody 20 ft wide, all of which is cuprite or chalcopyrite. Several truck loads have been shipped to the Anaconda copper smelter and have shown returns of 8 per cent copper.

Arizona Film Planned

Phelps Dodge Corp. has donated $45,000 to the Bureau of Mines for the filming of Arizona and its natural resources, according to an announcement by M. F. Leopold of the Bureau of Mines. The film, a 16 mm sound and color production, will be produced by a commercial concern under Leopold's direction.

Subject matter of the film will include mining and smelting, agriculture, general industry, pictures of the large cities, tourist resorts, and many of the state's scenic beauties. It will contain no commercial advertising.

AS&R Buys Block of Stock

The American Smelting & Refining Co. has announced the purchase of 150,000 shares of stock of the Silver King Coalition Mines Co. at $7 per share, plus $1.50 in dividends when paid. Stock was purchased from the Kearns Corp. of Salt Lake City, Utah.

Silver King Coalition has been in almost continuous production for nearly 70 years, and is regarded as one of the leading silver, lead, zinc producing mines in the West. The company's properties are located in the Park City mining region of Utah where the company controls more than 4000 acres of mineral ground.

This stock, together with stock previously purchased by the smelting company is believed to give it control. However, no change will be made in operating personnel at the present time, it was announced.

Alaskan Operations

Although the future for capital appeared dark in Alaska on account of high prices, Graham D. Lammers of Spokane, Wash., foretold how the Alaskan gold miner may be saved by a free market for the yellow metal. Speaking before the Northwest Mining Assn. in Spokane in December he urged establishment of a free market as a means of doubling the gold development of the tundra territory.

Mr. Lammers of Spokane, operates with his father, Roy C. Lammers, the most northerly dredge in the world, on Klery creek channel 100 miles beyond the Arctic circle. Today they operate four dredges compared with 40 in action before the war. Mr. Lammers' grandfather, the late G. B. Dennis, was the first president of the Northwest Mining Assn., and he

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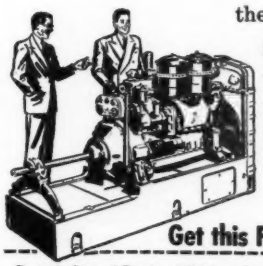

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17½¢ per lb. on the gray market for steel sheets which costs less than

5¢ per lb. in standard mill-to-customer channels.

Such patrons of the sharpies are skating on very, very thin ice. Why? Simply because less than 5% of U. S. steel production is leaking into the gray market. Not very many steel users can stay in business very long on 5% of the total tonnage.

Steel users are far more apt to stay in business longer by depending fully upon the steel industry which has voluntarily held advances in steel prices to a modest minimum in the face of steel making costs which have soared far above normal.

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1st—By making more steel products than ever before in Sheffield history.

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3rd—By asking all of our customers not to resell at more than regular market prices.

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Steel IS Cheap—in relation to costs, in relation to demand and in relation to price advances on virtually all other commodities. Let's keep it so and stay in business longer.

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speaks from a background of wide experience of several generations in the mining field of the region.

On the subject of statehood for Alaska Mr. Lammers stated that he did not believe this step would prove beneficial. In an area too large there are but 80,000 people. Meanwhile, the Eskimo and Indian populations are being sadly depleted, particularly the younger natives who are more susceptible to disease.

Platinum Ore Reported

William M. Thacher, veteran editor of the *Reese River Reveille*, of Austin, Nev., recently reported the finding of platinum bearing ores in the famous Lander Hill. Mr. Thacher pronounced it the most "stirring mining discovery" since the famous discovery of high grade ruby silver ore at Austin.

The ore reported was found in workings of the Nevada Equity Mining Co. Robert H. Raring, who has the reputation of "knowing his minerals," says the platinum ores are of commercial amounts, varying from $2 per ton to as high as $60 per ton.

Conveyor Belt Speeds Production at Bagdad

Bagdad Copper Corp. has placed in operation its new 1000-ft conveyor belt by which all copper ore is conveyed directly from the open pit to the mill. When production from the open pit was started, the ore was passed through the glory hole to the underground haulage system, then hoisted by the No. 3 shaft to the mill, but as output increased some other means had to be provided. At present Bagdad is mining about 90,000 tons of ore monthly and employing a crew of 300 men. The open pit is 600-ft wide, 1800-ft long and has attained a depth of 300 ft. An increase in the tonnage mined is expected next May following the delivery of a new five-yd shovel. Ernest R. Dickie, Bagdad, Ariz., is general manager of the company.

Old Mines May Reopen

In the Hopewell mining district in Rio Arriba County, N. Mex., reopening and development of the old Creasus mine and Red Jacket property is planned by Rufus Little, president and general manager of New Mexico Mines, Inc. In the 1880's the district was a profitable gold-silver producer and recent examination shows promising copper values, according to Little.

Wheels of Government

(*Continued from page* 84)

port of the three-man Board of Inquiry appointed by the President under the Taft-Hartley Act. Under the Act the President may call upon the Attorney General to petition for an injunction restraining the UMWA officials from carrying on the strike. If necessary this procedure could be followed by contempt of court proceedings resulting in fines and imprisonment.

John L. Lewis opened up action over the controversy involving a $100 monthly pension for each member of the union 60 years of age who has worked 20 years in the mines, by addressing a letter to UMWA members telling them he had been unable to otain agreement from coal operators on a pension plan. The letter called upon the miners to "discuss this matter in your local unions so that our membership may be fully advised." The letter was dated March 12 and on the following Tuesday the mines were idle and have so remained. Lewis is understood to be demanding that some 60,000 miners who have not been employed in the mines for a number of years be included in those eligible for pension payments.

The operators' representative on the UMWA Welfare and Retirement Fund, Ezra Van Horn of Cleveland, urged Lewis to join with him in applying to the U. S. District Court for the appointment of a neutral trustee, but Lewis did not respond. The operators' negotiating committee asserted in a letter to Lewis that the 1947 Wage Agreement has been executed in good faith; that the required payments into the Welfare Fund have been made, and that the operators "have fully acquitted themselves of their contractual obligations." Representatives of the operators and the UMWA met with Conciliator Ching on March 22 on Ching's proposal that the miners return to work and that a jointly selected three-man, fact-finding board be created. This the miners rejected.

Then the President appointed the three-man Board of Inquiry under the Taft-Hartley Act. On March 26 the Board held its first public meeting but the Mine Workers' officials failed to attend. The Board reconvened March 29 and Lewis instead of appearing sent a letter stating that no action taken by the Mine Workers would fall within the application of the Taft-Hartley Act. The Board promptly issued a subpoena for Lewis' appearance in the afternoon. He did not appear. The U. S. Attorney General then obtained an order from the Federal District Court requiring Lewis to appear before the Court and explain why he could not be made to respond to the Board's subpoena.

Lewis appeared before the Court on the morning of March 30 and then before the Board in the afternoon. He reiterated his previous contention that he had done nothing to "inspire" the strike, maintaining that his letter of March 12 to the union membership was his report to them as trustee for the Welfare Fund. Further action under the Taft-Hartley Act on enjoining the strike and ordering the 80-day moratorium is up to the White House.

Meanwhile, Chairman Hartley (Rep., N. J.) of the House Labor Committee has introduced a bill amending the Taft-Hartley Act to authorize anti-trust action against unions which call a concerted strike against two or more employers. The bill would also suspend, in such cases, the provisions of the Norris-LaGuardia Act which restricts the use of court injunctions against labor unions.

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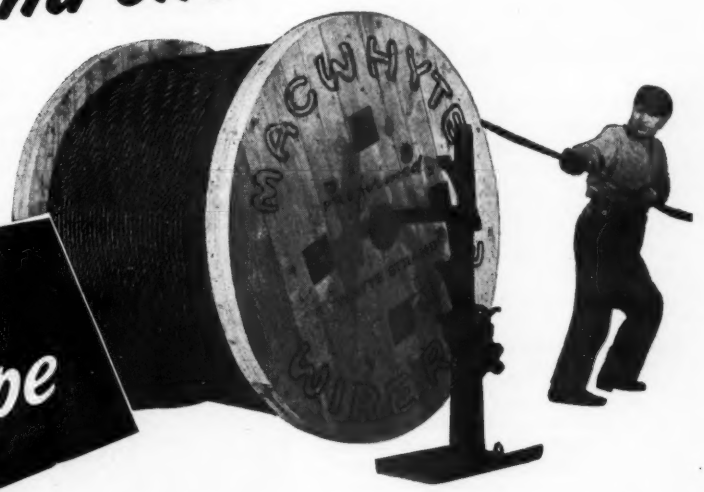

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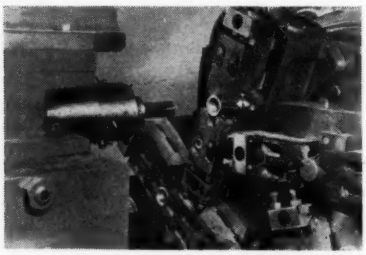
Manufacturers Forum

Timken Performs Unusual Tapping Job

The Timken Roller Bearing Co. of Canton, Ohio, is doing what has been claimed to be an "impossible" job at their Mount Vernon, Ohio, plant. Timken is blind-hole tapping six-pitch threads in extremely tough steel rockbits used for quarrying and mining plus rough and finish drilling, facing, counterboring—each in a single operation on a five-station machine.

Key operation was the tapping of the six-pitch thread in the blind hole in one operation. The thread has a special radius form which results in

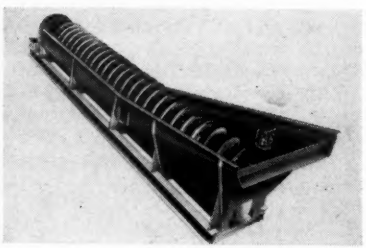


an unusually heavy load on the one-thread chamfer of the bottoming tap. Although tap life theoretically should be short on a single pass setup of this type, Timken reports getting some 15,000 rockbits per tap, using special spiral fluted taps produced specifically for this job by Detroit Tap & Tool Co., Detroit.

Lower Costs Claimed for New Classifier

The Western Machinery Co. states that a new Wemco "S-H" (special helix) classifier, one size smaller diameter than other type units, can do exactly the same job as the other type units at lower initial cost and lower operating cost. This is said to result from the progressive design of such features as the new special helix, shaft design, tank design, lifting mechanism, drive arrangement, and main bearings.

By increasing spiral pitch in relation to the spiral diameter, a third flight or ribbon has been adapted to the spiral design. This improvement has several operating advantages over



previous types. It is reported to greatly increase the machine's ability to rake or convey sand loads to such an extent that in many cases sand raking capacities for any particular size diameter will increase up to as much as 100 per cent, depending, of course, upon the nature and problem of material being handled.

Correction

Power units produced by the Hercules Motor Corp., Canton, Ohio, were incorrectly described in the January issue. The company's engines have a power range of from 3 to 400 hp.

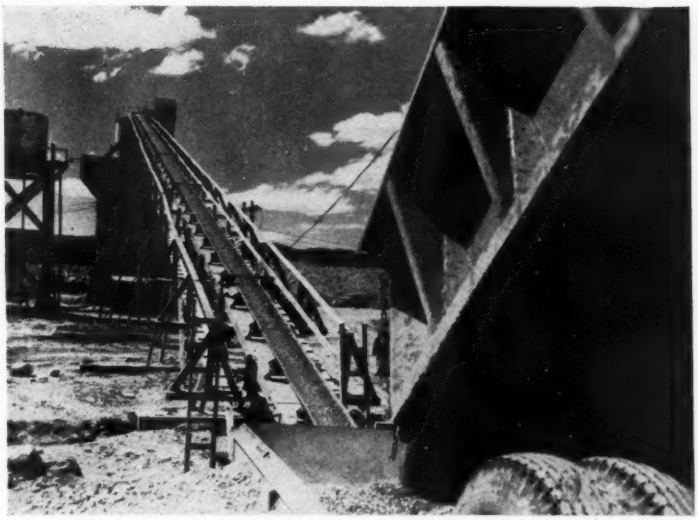
Mines Use Quonsets for Surface Construction

A number of mining companies are using Quonsets for mine portal facilities and other surface installation in order to realize their various advantages. The buildings are erected quickly without the use of cranes or other heavy equipment and the framework is readily adaptable for most usages and can be salvaged for reuse in another location.

One of the largest users of Quonsets is the Consolidation Coal Co. (Ky.), a subsidiary of the Pittsburgh Consolidation Coal Co. which has adapted a number of these buildings for administration offices, repair shops, stockrooms, and bathhouses. Others have been used for storage plants, general stores, service stations, and restaurants. The Great Lakes Steel Corp., Stran-Steel Div., claims considerable economic advantages for the Quonset on a basis of original material cost and completed erection cost.

George Keat, construction engineer for Consolidation Coal Co. (Ky.), says, "mining today needs an economical construction that will pay for itself rapidly, have salvage value, and be easily and quickly erected at inaccessible locations. The Quonset offers the closest approach to this situation by providing a cheap, fire-safe building, capable of lowest cost installation that can be had in today's building construction, and I do not hesitate in advocating use in further construction for this company."

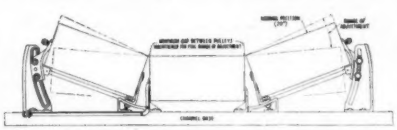
Marshall's Branch portal of the Consolidation Coal Co., Mine 204, Jenkins, Ky.



Construction of Granby Dam units, part of the Colorado-Big Thompson project, is speeded by this Goodyear Style W conveyor belt which hauls aggregate to the batch plant. When completed, the earth-filled dam will be 885 ft long and 232 ft high providing storage for 482,000 acre-ft of water.

Adjustable Troughing Idler Announced

A new adjustable troughing idler said to materially increase the life of conveyor belts, has been announced by Koppers Company, Inc. Inventor P. J. Conners, of Koppers' Engineering and



Construction Division, has assigned the patent to the company.

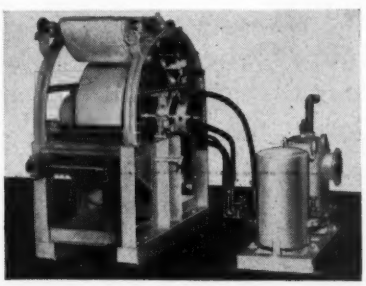
Outer inclined pulleys are adjustable from slightly above the horizontal up to an angle of 25 deg. All idler pulleys are located in the same vertical plane and the adjustment of the outer pulleys is accomplished in a manner which maintains a constant gap between the ends of the horizontal and inclined pulleys. This gap is kept to a minimum to eliminate any possibility of the belt being damaged due to creasing or pinching at such points.

Distribution Service Provides Many Items

The National Mine Service Co. announces the opening of its Anthracite Division office and warehouse at 153 Welles Street, Forty Fort, Pa., under the supervision of J. E. Ward. Complete distribution facilities for original Joy-Sullivan-LaDel repair parts, Wheat electric cap lamps, Koehler flame safety lamps, Roebling wire rope, locomotive and mining machine parts of Bemeco manufacture, and various other maintenance items and mine supplies will be provided. Three other divisions of National Mine Service Co. are in full operation: Bemeco Division, in Beckley, W. Va.; All-State Division, in Logan, W. Va.; and Kentucky-Virginia Division, in Jenkins, Ky. Gordon MacVean is president and general manager, R. H. Magee, vice-president, and E. J. Nicholls, secretary. J. D. A. Morrow and A. S. Knoizen, of Joy Manufacturing Co., are members of the board of directors.

Pilot Plant Filter Available on Rental-Purchase Plan

For pilot plant, or for small or temporary production filtering operations where it is not advisable to tie up capital by outright purchase of filtration equipment, a new rental-purchase



plan has just been announced by Filtration Engineers Inc., 858 Summer Avenue, Newark 4, N. J.

This plan is revealed coincident with the introduction of a new pilot-plant, rotary-vacuum filter with the efficient, adaptable FEinc string discharge and washing mechanisms.

Under the plan, the pilot plant filter is placed with the customer on a monthly rental basis. The fee for the first month is set low to allow for time lost in starting up the process.

In the event the customer later purchases a larger filter for full scale production, or decides to purchase the pilot plant filter, Filtration Engineers Inc. will issue a credit allowance based on the number of months the small filter is rented.

— *Announcements* —

Frank E. Mueller, President of **Roberts & Schaefer Co.,** announces that, effective April 1, 1948, **R. T. Middleton,** Vice President, has been appointed manager of sales and will handle all sales inquiries from their Chicago office.

* * *

C. H. Rieman has been appointed manager of the **Gardner-Denver Co.** branch office in Duluth. Mr. Rieman is assuming the managership held by the late C. L. Kohlhaas.

* * *

The **Marion Power Shovel Co.** has appointed **R. W. "Bob" Head** as its district sales manager with headquarters at 4534 Travis Street, Dallas 5, Tex. His territory will include Texas, New Mexico, Oklahoma, and part of Arkansas.

R. W. "Bob" Head

* * *

Link-Belt Co. has established a sales office in Louisville, Ky., with headquarters at 136 South Fourth Street, Louisville 2.

Emmart LaCrosse, Jr., formerly district sales engineer at Indianapolis, has been appointed district sales manager in charge of the new office.

* * *

Election of **A. N. Morton** and **A. C. Fetzer** as vice-presidents of **Mack Trucks, Inc.,** has been announced by President C. T. Ruhf.

* * *

Pardee H. Frank, service manager of the **Timken Roller Bearing Co.,** retired February 1 after 27 years of continuous service, according to an announcement by Timken officials. He is replaced by **Elmer Anderson,** who has been assistant service manager for the past year and a half.

* * *

The **Jeffrey Manufacturing Co.,** Columbus, Ohio, recently announced that the mining office in St. Louis had been discontinued. **Fred L. Kolb,** formerly district manager there, has been moved to Chicago where he will take over the position of district manager of the mining division, with offices in the Bell Building.

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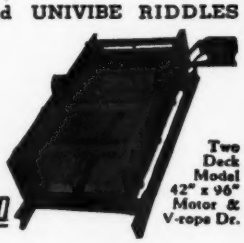


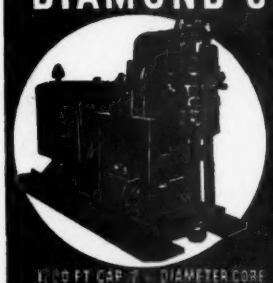
Two Deck Model 42" x 96" Motor & V-rope Dr.

DIAMOND CORE DRILLING

CONTRACTORS

TESTING COAL AND ALL MINERAL PROPERTIES-USING OUR LIGHT GASOLINE DRILLS..THEY SAVE FUEL AND MOVING COSTS..WE GUARANTEE SATISFACTORY AND PROPER CORES..

PRE-PRESSURE GROUTING FOR MINE SHAFTS...GROUND SOLIDIFICATION FOR WET MINE AREAS BY OUR STOP GROUT METHOD. WATER WELLS AND DISCHARGE HOLES DRILLED AND GROUTED...ELECTRIC DRILLS FOR INSIDE MINE DRILLING..



MOTT CORE DRILLING CO.

HUNTINGTON, W. VA.

The Model T Rear-Dump Euclid has abundant power and speed for steep grades. Distribution of weight and large tires result in excellent traction and flotation.

Dumping 22 tons of iron ore into drive-over hopper on the Mesabi Range in Minnesota. Load is shed quickly because of smooth body interior and high dumping angle.

DESIGNED to work with large loading equipment, the Model T Euclid has extra large capacity and unusual power and speed for steep grades. Low loading height, large top area, fast hoist action, high dumping angle, exceptional maneuverability and traction, and high ratio of horsepower to weight . . . all of these Euclid features contribute to efficient performance.

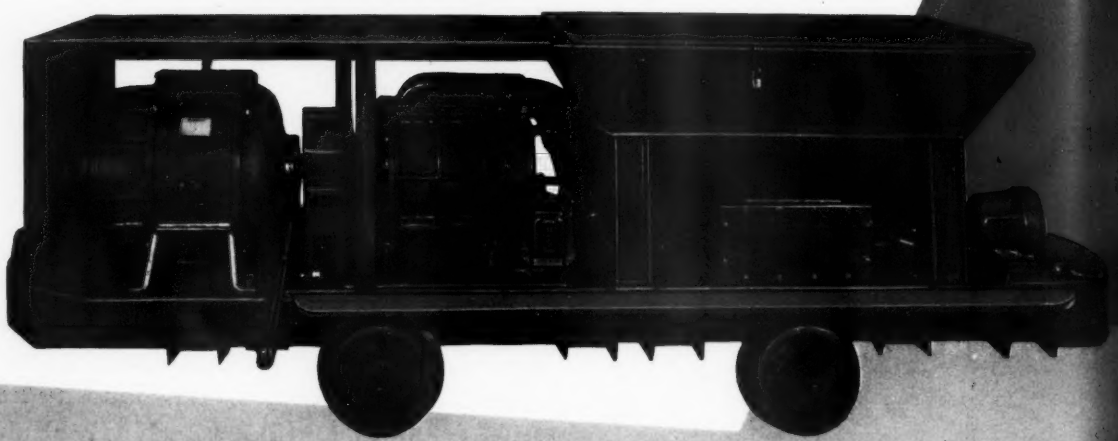
This model has a struck measure capacity of 14.8 cu. yds. and payload capacity of 44,000 lbs. Powered by Diesel engine of 200 to 275 h.p. rating, top speed with capacity payload is 32.3 m.p.h. Hydraulic steering is standard equipment. The drive axle is full-floating and planetary type double-reduction, built for big loads, large engines, and heavy service.

Wherever extra capacity and power are required to move large yardages on difficult hauls, the Model T will do the job with speed and efficiency.

The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

Here's High Speed

thorough Rock Dusting for the entire mine at Lower Cost!



M·S·A TYPE "S" HIGH PRESSURE ROCK DUST DISTRIBUTOR

The rapidity and thoroughness of this high-pressure machine enables complete rock dusting of the mine at lowest cost. The high discharge rate of the Type "S" Distributor—225 lbs. of dust and more per minute through 4-foot hose section, or between 90 and 100 lbs. per minute with 500 feet of hose—enables complete and efficient rock dusting of the entire mine. More dust applied per man-hour of operation keeps labor cost down; the richer stream of dust improves application on roof and ribs, without excess dusting of the bottom—another important economy in rock dust costs. Write for complete details.

For Working Face Dusting—readily transported by shuttle car, belt or pan conveyor, rubber-tired truck, etc.

M·S·A BANTAM HIGH PRESSURE ROCK DUST DISTRIBUTO

Here is a compact and convenient machine, small in yet high in performance; discharging dust through feet of hose, yet capable of being transported on type of mine conveyance. The Bantam incorporates outstanding features of the Type "S" Distributor ab and will maintain adequate rock dusting right in working-places. Let us send you the descriptive de

OTHER M·S·A ROCK DUST DISTRIBUTORS include portable and semi-portable types—statio nozzle distributors and special low-height machine all mine conditions.

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